EUROCOMACH®

Operation and maintenance manual

COMPACT TRACKED EXCAVATOR

KUBOTA ENGINE

ES 28 ZT

ES 35 ZT

ES 40 ZT

This manual must always be kept on-board the machine.

"Translation of the original instruction"

01-05-12 Release
Rev. 00
Code B000201248

TESTING REPORT AND CERTIFICATE OF GUARANTEE

Machine .....

Serial No. .....

Motor type .....

Serial No. .....

Date of delivery .....

Dealer .....

The undersigned .....

Company Proprietor / Representative .....

Residing at .....

Address ..... No. ..... Phone .....

having carried out the operational tests and checked the proper working efficiency of the machinery in question and of the related accessories, under his own personal responsibility

HEREBY DECLARE

that the testing was deemed to be satisfactory and accepts the above equipment is in its entirety, without reserve. He also confirms he has taken note of the manufacturer's general guarantee conditions listed overleaf and that he accepts them.
In addition, he dedares himself satisfied with the verbal technical explanations given and, having ascertained that the operating machinery in question complies with what was ordered, hereby signs in acceptance of this TESTING REPORT AND CERTIFICATE OF GUARANTEE.

Date,.....Signed.....

GUARANTEE CONDITIONS

This certificate forms an integral part of the "operation and maintenance" manual and must be completed in full by the Customer and sent by registered mail to the manufacturer, SAMPIERANA S.p.A. Via L. Da Vinci, 40 - 47026 5. Piero in Bagno (FC), within ten days from the date of delivery in order to validate the GUARANTEE.

Delivered by Mr. .....

From the Company .....

Technician's signature

CUSTOMER's copy .....

WARRANTY

The Manufacturer provides this certificate to every Purchaser of this machine. The Manufacturer hereby certifies all parts of the machine to which this certificate refers to be free from defects in terms of materials, workmanship and assembly.

The Manufacturer undertakes to replace, or arrange for replacement by an authorised workshop and to repair, or arrange for repairs by an authorised workshop of any defective parts for a period of 12 (twelve) months from the date of delivery, or the first 1000 (one thousand) working hours, whichever occurs first.

Under the terms of this guarantee, the Manufacturer or Vendor will debit the User with any travel costs, travelling expenses and any other costs incurred in the carrying out of any interventions away from the Vendor's Premises, while the cost of any spare parts replaced will not be debited to the User.
This guarantee specifically excludes tyres, inner tubes, electrical components, starter motor nor any component not produced by the machine Manufacturer himself.

This guarantee will be invalidated by the following actions:
- if the machine has been used for purposes other than those for which it was manufactured;
- if the repairs or the replacements were not executed by authorised workshops;
- if the defects indicated are due to accidents or negligence, or improper use of the machine;
- if items not produced by the Manufacturer have been installed on the machine, andtheir use has caused the defects indicated;
- if the machine has been modified, repaired or dismantled by unauthorised workshops.

This guarantee certificate replaces entirely any other implicit or explicit guarantee contained in any previous agreement, legal provision or use.

In terms of art. 1341 and 1342 of the Italian Civil Code, the undersigned confirmsthat he fully understands and unconditionally accepts all the exclusions from the guarantee contained in point 2, as well as the limits of the validity of the guarantee, as listed in point 1 of this certificate.

SAMPIERANA S.p.A. declines all responsibility for any injury to persons or damage to equipment, or issues arising from the use of, orfor reasons of, or relating tothe products supplied, including during the pre-delivery testing.

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info@sampierana.com - http//:www.sampierana.com - www.eurocomach.com
Income Tax and VAT Reg. No.02712200407- EEC identification code - IT 02712200407 - Provincial Register of Companies No. 27534/1999 – Economic Register of Companies No. 285868 – Punch-card Data Processing Number FO015435

TESTING REPORT AND GUARANTEE CERTIFICATE

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Motor type .....

Serial No. .....

Date of delivery .....

Dealer .....

The undersigned .....

Company Proprietor / Representative .....

Residing at .....

Address ..... No. ..... Phone..... having carried out the operational tests and checked the proper working efficiency of the machinery in question and of the related accessories, under his own personal responsibility

HEREBY DECLARE

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Delivered by Mr. .....

From the Company .....

Technician's signature

DEALER's copy .....

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Delivered by Mr. .....

From the Company .....

Technician's signature

MANUFACTURER's copy .....

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REPLACEMENT OF MANUALS

In the event that th e Use and maintenance manual is lost, please con tact your local EUROCOMACH service centre.

For any communications relating to the machine purchased, as well as any questions or comments on this user manual, please refer to the following address:

SAMPIERANA S.p.A.
40 Via Leonardo da Vinci
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MANUAL

CODE	**B000201248**
VALID FROM SERIAL NO.	**DB 00051** → **CT 00051** → **CZ 00051** →
PRINTING DATE	**01-05-12**
MACHINE YEAR OF CONSTRUCTION	**20_ _**

ENGINE

MACHINE	**ES 28 ZT - ES 35 ZT**	**ES 40 ZT**
BRAND	**KUBOTA**	**KUBOTA**
MODEL	**D1503-M**	**D1803-M**
DISPLACEMENT	**1499cc**	**1826 cc**
SERIAL NUMBER		

1.0 Introduction

The safe use of your machine is first and foremost the responsibility of the persons using the same on a daily basis.

It is therefore important for the operators to have access to detailed information on the correct use and maintenance of the machine.

⚠ WARNING

IMPORTANT:

- the "driver-operator" is deemed to be a competent operator charged with the task of moving and manoeuvring the machine;

- Use of the machine by a "competent operator" is included as one of the normal operating conditions;

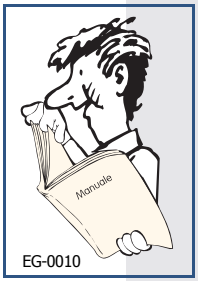
- It is the employer's duty to provide the necessary training and skills, especially when introducing any new work accessories (Leg. Dec. 626, art. 22, paragraph C);

- An integral part of any training and skill-building programme is ensuring that the operator reads, studies carefully and proves his understanding of this manual, particularly as regards the safety provisions contained therein.

1.1 General precautions

The Use and Maintenance Manual forms an essential and integral part of the machine and must be made available to the user.

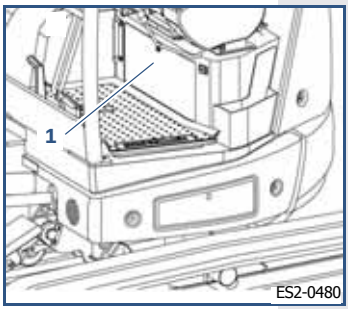
This manual must always be kept on-board the machine or, in any event, somewhere where the operators have access to it, and must accompany the machine in the event of its sale.



EG-0010

It must be kept in the special lockable compartment (**1**) provided and consulted carefully since it contains important information regarding operator safety, vehicle operation and proper maintenance.

The personnel authorised to operate the machine must read this manual before using the machine for the first time.



ES2-0480

The machine must only be used for the purpose for which it was specifically intended. All other uses are deemed to be improper and, therefore, dangerous.

This manual contains the necessary information for machine operation, maintenance and lubrication.

Constant adherence to the instructions in this manual will result in a longer, trouble-free working life and a reduction in maintenance costs and down time. Furthermore, it will be possible to eliminate the most common causes of accidents that may be encountered during operation and maintenance activities.

It is in everyone's interest that these rules be followed and that the purchaser understands that this manual is an integral part of the machine and that he accepts full responsibility for ensuring that the operator consults the manual and that the instructions contained herein are followed scrupulously.

The manufacturer shall not be contractually or otherwise liable for any damage resulting from the incorrect use or handling of the vehicle, or from any failure to comply with the manufacturer's instructions.

The maximum expected life span of this machine is deemed to be 10 years or 10,000 work hours. The life span is subject to the regular inspections and maintenance operations being carried out as specified in the applicable manual. Once either of the abovementioned deadlines has been reached, the machine must undergo a special inspection, to be performed by the manufacturer or an authorised dealer, in order to ascertain the level of wear and tear and the remaining working life of the machine. If not, the machine must be decommissioned.

IMPORTANT

Eurocomach reserves the right to modify the product and amend the associated technical documentation without in any way constituting any form of obligation towards third parties.
This version of the operation and maintenance manual describes the characteristics of the standard machine, at the time of going to print.

1.2 Consulting the manual and the terminology used

1.2.1 Consulting the safety signs in the manual

For a better understanding of the information in this manual, those instructions deemed to be critical or hazardous are highlighted with the following symbols:

DANGER

DANGER

Information or message that, if not strictly observed, may result in serious injury or even death.

CAUTION

CAUTION

Information that, if not strictly observed, could cause minor injury or serious damage to the machine.

WARNING

WARNING

Information or precautions that should be observed to avoid damaging the machine, or in any case part of the text that should be noted.

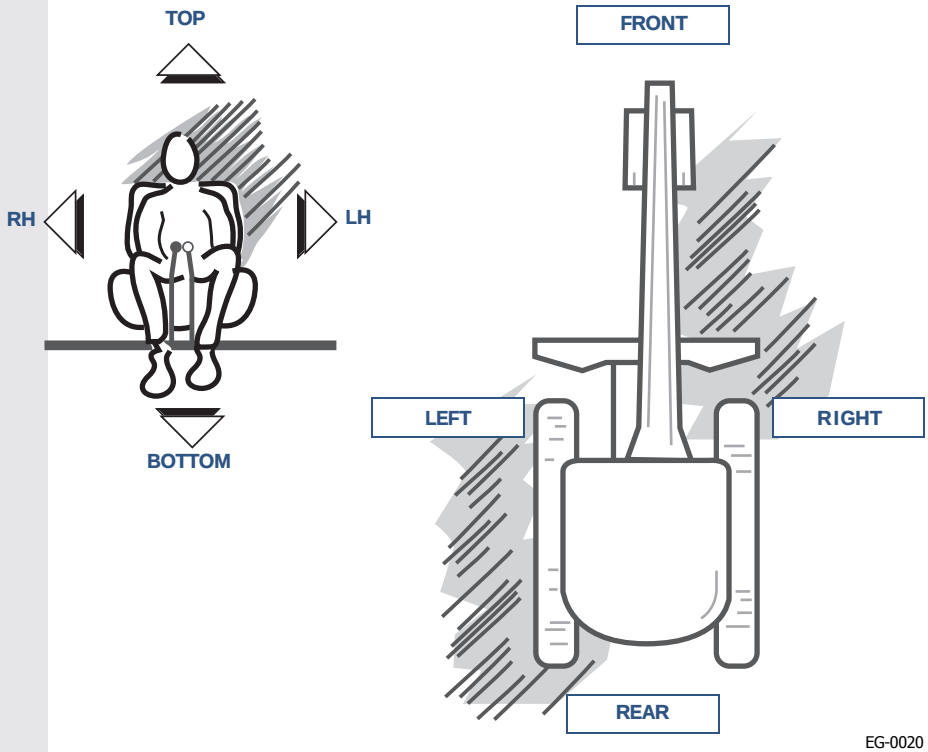
NOTES ON SAFETY

It is impossible for Eurocomach to foresee every possible situation that may constitute a potential hazard during machine operation or maintenance; for this reason, the safety messages in the manual and on the machine data plates may not entirely cover all possible precautions to be taken. If you are unsure of the safety requirements for some of the procedures, contact EUROCOMACH or the local dealer.

1.2.2 Terminology used in the manual

The manual has been drafted using conventional terminology, as explained below:

- "left" and "right" mean on the left and right hand side of the operator when he is sitting in the driving seat.
- "front" is always the part of the vehicle where the dozer blade is fitted.
- "rear" is always the part of the vehicle opposite to the dozer blade position.

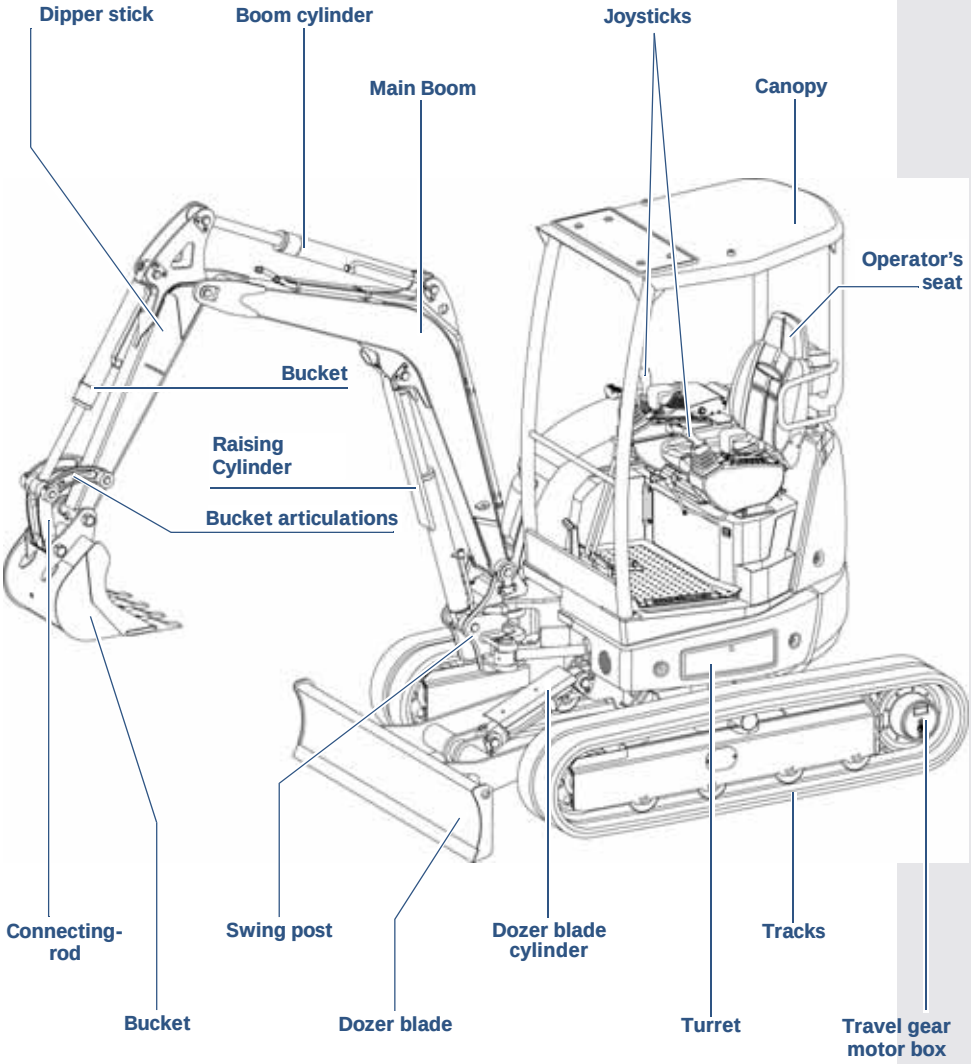


EG-0020

For ease of use and maintenance, the following are the names of some of the machine parts, which will be referred to in the descriptions provided in the manual.

Models ES28ZT, ES35ZT and ES40ZT look identical, and so the illustrations that follow are the same for all models.

CANOPY VERSION



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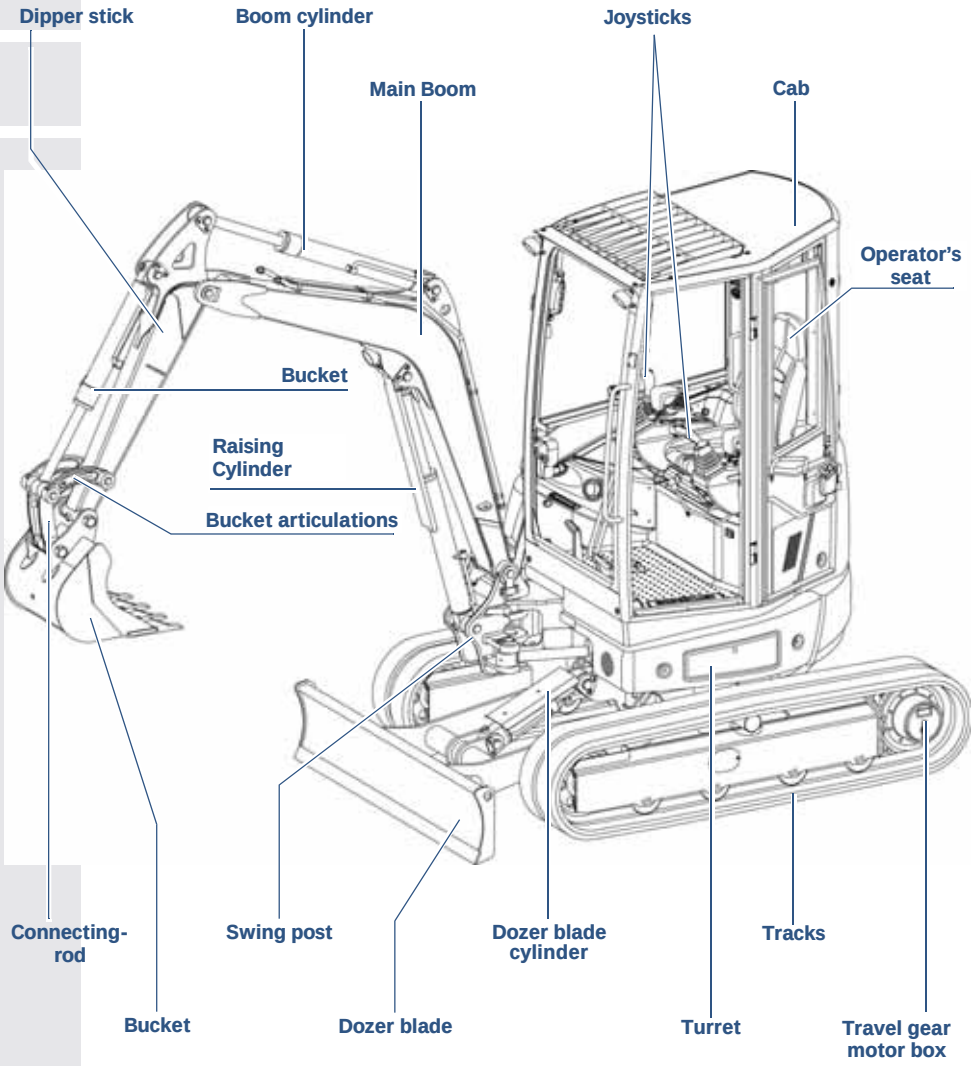
CAB VERSION



ES2-0020

IMPORTANT

The descriptions and illustrations in this manual may not coincide with the actual machine due to modifications that have been made. Contact the local Dealer with regard to any parts of the manual that may be unclear.

1.3 Manufacturer

This operation and maintenance manual refers to the following machine:

TRACKED EXCAVATOR MINI-EXCAVATOR	
MODEL:	**ES28ZT**
	ES35ZT
	ES40ZT

The above machines with the EUROCOMACH trademark are manufactured exclusively by:

SAMPIERANA S.p.A.
40 Via Leonardo da Vinci
47021 S. Piero in Bagno (FC)
Tel. ++39 0543 904211
Fax ++39 0543 903108/918520/901246
E-Mail: info@sampierana.com
http//www.eurocomach.com

The Eurocomach **service centre** is at the customers' disposal to assist with any technical problems and spare parts orders.

For any communications relating to the machine purchased, the following information should always be provided:

a - machine model

b - serial number

c - year of manufacture

d - date of purchase

e - engine model and serial number

f - details regarding the problems encountered.

Only original spare parts should be used when replacing machine parts; Eurocomach cannot accept any liability whatsoever for any deterioration of machine performance or damage to the machine due to the use of non-original spare parts.

Maintenance operations that cannot be carried out easily with the means normally available to the private individual should be undertaken by a dealer who has access to trained technicians, appropriate means and original spare parts.

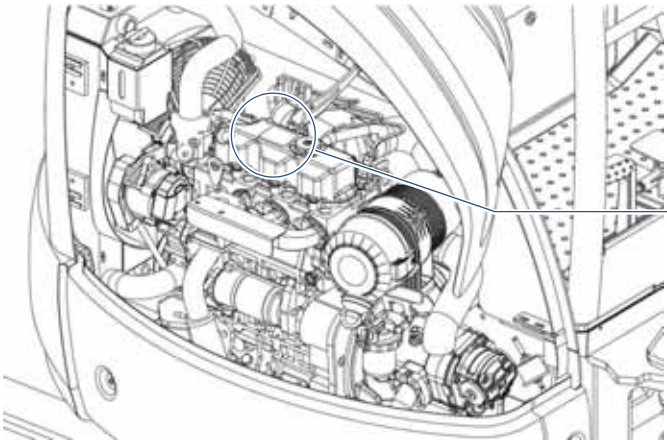
The Eurocomach service centre is at the customer's disposal to provide any required explanations and advice, or to intervene with the company's own specialised technicians if there are any doubts regarding machine performance.

1.4 Machine identification data

The location of the machine ID plate is as in the figure; this identifies the machine type and model number; The information on this plate and the engine tag are necessary when requesting spare parts or indicating any malfunction to the Service Centre.

IMPORTANT

The data on the information plate must not be changed for any reason.



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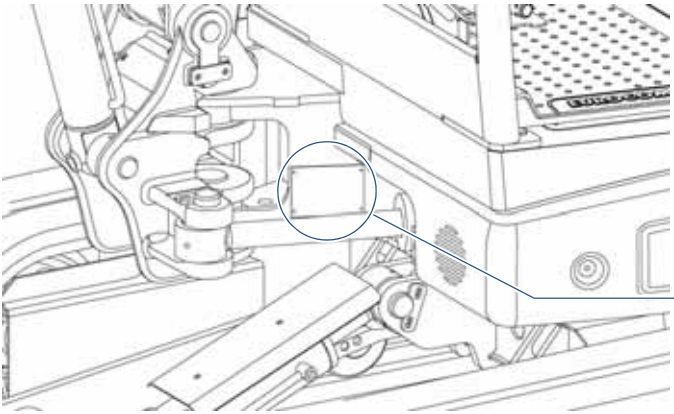


ES2-0040

1.5 CE Conformity Declaration

The CE Conformity Declaration is the document signed by the manufacturer that guarantees and proves that the machine complies with all the reference standards in terms of safety.

This document must be kept on board the vehicle at all times and must accompany the machine until it is finally decommissioned.

The declaration shows all the identification details regarding the machine, the manufacturer and all the reference standards that apply. The following is a facsimile of a CE declaration:

DICHIARAZIONE CE DI CONFORMITÀ

secondo allegato II A della Direttiva 2006/42/CE

(EC declaration of conformity according annex II A of Directive 2006/42/EC)

CE

Il sottoscritto *(The undersigned)* PARA CESARE, legale rappresentante della ditta *(legal representative of the firm)* **SAMPIERANA S.p.a.** . - Via L. da Vinci, 40, 47026 S. Piero in Bagno (FC) **in qualità di costruttore** *(in quality of manufacturer)*

DICHIARA *(DECLARES)*

sotto la propria personale responsabilità che la macchina *(under his own responsibility that the machine)*

MACCHINA	*(MACHINERY)* ..... :	HYDRAULIC TRACKED EXCAVATOR
FUNZIONE	*(FUNCTION)* ..... :	DIGGING
TIPO-MODELLO	*(TYPE-MODEL)* ..... :	EUROCOMACH - ES xxx xx
N° MATRICOLA	*(SERIAL N°)* ..... :	Cx xxxx
ANNO FABBRICAZIONE	*(CONSTRUCTION YEAR.)* ..... :	XXXX
POTENZA NETTA (CFR. 97/68/CE)	*(POWER, kW)* ..... :	xx

COMPONENTI DI SICUREZZA FORNITI CON LA MACCHINA	*(SAFETY COMPONENTS SUPPLIED WITH THE MACHINE)* ..... :	TOPS-FOPS STRUCTURE

ATTREZZATURE INSTALLATE	*(EQUIPEMENTS INSTALLED)* ..... :	BUCKET MOD. XXX

- è conforme alle disposizioni della Direttiva 2006/4 2/CE *(complies with the requirements of Directive 2006/42/EC)*
- Persona autorizzata a costituire il fascicolo tecni co *(person authorised to compile the technical file)*:
  - Nome *(Name)*: Fabbri Giuseppe
  - Indirizzo *(Address)*: Via L. da Vinci, 40, 47026 S. Piero in Bagno (FC)
- è conforme alle disposizioni della Direttiva 2000/1 4/CE – "Direttiva emissione acustica ambientale delle macchine ed attrezzature destinate a funzionare all'aperto" – alla Direttiva 2005/88/CE e ai decreti di trasposizione nella legge nazionale *(complies with the provision of the Directive 2000/14/CE – "Noise emission in the environment by equipment for use outdoors" – the Directive 2005/88/CE and the regulations transposing into national law)*
  - Tipo di macchina: Escavatore idraulico, in accordo alla definizione n. 20 dell'Allegato I - Direttiva 2000/14/CE *(Machine type: Hydraulic Escavator, in accordance with definition n. 20 Annex I - Directive 2000/14/CE)*
  - Procedura applicata per la valutazione della confor mità: Controllo interno della produzione con valutazione della documentazione tecnica e controlli periodici, Allegato VI - 2° procedura Direttiva 2000/14/CE *(Procedure applied for the conformity assessment: Internal control of production with assessment of technical documentation and periodical checking, annex VI- 2nd procedure directive 2000/14/CE)*
  - Organismo notificato *(Notified body):* ECO S.p.a Via Mengolina, 33, 48018 FAENZA (RA) ITALY

LIVELLO DI POTENZA SONORA MISURATA	*(MEASURED POWER ACOUSTIC LEVEL)*	*dB (A):*	xx LwA
LIVELLO DI POTENZA SONORA GARANTITO	*(GUARANTED POWER ACUSTIC LEVEL)*	*dB (A):*	xx LwA

  - Depositario file tecnico: SAMPIERANA S.p.a – Via L. da Vinci, 40, 47026 S. PIERO in BAGNO (FC) ITALY *(Technical files kept by: SAMPIERANA S.p.A. – Via L. da Vinci, 40, 47026 S. PIERO in BAGNO (FC) ITALY)*
- è conforme alla Direttiva 2004/108/CE (*is in accordance with the Directive 2004/108/CE*)
- è conforme alla Direttiva 97/68/CE e successive modifiche *(is in accordance with the Directive 97/68/CE and following modifications)*

	SÌ	NO
Variante per la movimentazione dei carichi sec. EN 474-5 punto 5.6.4 *(variation for lifting loads (EN 474-5 point 5.6.4)*		X

S. Piero in Bagno, xx-xx-xxxx

Il legale rappresentante (the legal representative of the firm)

Cesare Para

EG-0030

2.0 Intended use and contraindications

2.1 Intended use

EUROCOMACH has designed and manufactured its excavators so that they comply with the following EC directives:

- 2006/42/EC (Machine directive)
- 2004/108/EC (EMC Directive)
- 2000/14/EC and 2005/88/EC (noise Emission directive)

and to satisfy any requirements that may be encountered on a construction site; it is a powerful, quiet and reliable machine even under the most demanding working conditions.

The machines described in this manual are built to be operated by persons mainly trained to carry out the job of "earth moving and excavations" using the dozer blade and the bucket.

If equipped with suitable safety systems, they may be used with authorised optional accessories and in any case with the characteristics stated in point 8.0.

All machines are designed and built on the basis of the work for which they are intended. Therefore, the technical characteristics of each machine must be understood to be limited to the intended use of the machine.

Maintenance is simple and minimal.

The excavator is the natural choice for work on road-building sites, on building projects, industrial maintenance operations, building renovation sites, railway works, laying of pipelines and cables and work in public parks and cemeteries.

The quiet Diesel engine transmits the maximum power to the hydraulic system, which has its own regulation valves.

The control console was designed to elicit an immediate response from the hydraulic motors and cylinders.

The rubber tracks are suitable for working environments where the ground must be protected against permanent damage.

No modification may be made to the machine without EUROCOMACH's authorisation, since the modification may involve certain dangers.

It is nevertheless necessary to adhere strictly to the safety regulations contained in this manual.

2.2 Contraindications

CAUTION

This machine is designed for use solely in the sectors referred to in the previous section.

This section states some of the improper or non-authorised uses; as it is impossible to foresee all likely improper uses, if particular occasions for using the machine arise, before embarking in the work contact the EUROCOMACH Service Centre.

IMPORTANT

The use of the excavator for any task other than those described is strictly forbidden.

The instructions for the authorised optional equipment are described in the respective use and maintenance booklets; if the accessories are supplied by EUROCOMACH, the booklets are enclosed with this manual.

The instructions for fitting the authorised equipment, any controls that required connection to the machine and the hydraulic attachments need to make the accessories work are grouped together in point 8.0.

- Eurocomach can accept no liability in the event of unauthorised uses or any failure to comply with the manufacturer's instructions.
- Never use the excavator as a lifting tool unless it is fitted with the specific optional accessories.
- Never use the excavator in enclosed spaces unless there is an effective system in place for the extraction and discharge of exhaust gasses.
- Whenever possible, avoid driving over large obstacles, very uneven ground, boulders, fallen logs, steps, ditches, etc., which may cause the vehicle to tip over.
- Never drive along railway sleepers and rails that may damage the rubber tracks.
- Do not transport persons on board the excavator.
- Do not use the excavator to transport loads or to tow other vehicles.
- Never use the bucket for lifting or transporting people.
- Never use the excavator when it is not in peak condition for the job at hand, if it malfunctions, if the controls do not respond perfectly, if the cab is damaged or if visibility through the windows is not good.

- The machine is built to operate at temperatures ranging from 0°C to 45°C, therefore, avoid operating in temperatures falling outside this range.
- DO NOT allow the machine to be used by minors or unskilled persons .
- DO NOT trans port containers carrying flammable liq uids or any that are considered dangerous.
- DO NOT use the bucket as a pile driver or for extracting piles.

⚠ WARNING

Eurocomach cannot accept any responsibility in the event of accidents involving persons or property caused by non-compliance with the regulations and instructions listed in this manual and by failure to comply with safety regulations and accident prevention rules.

⚠ CAUTION

If the machine is used in an improper manner, the operator is personally responsible for his own safety and that of any other persons involved.

⚠ CAUTION

It is strictly prohibited to drive the machine on public roads, since the vehicle is not approved for this purpose. Therefore, the machine may only be operated on private property and/or construction sites that are closed to the public.

2.3 Machine operator

The machine must only be operated and maintained by persons who:

- Are over 18 years of age.
- Are physically and mentally fit for the task and are able to meet the requirements of machine operations at peak performance.
- Have been trained to operate and maintain the mac hine and know it s tec hnical specifications, its overall dimensions and its performance and limitations.
- Know the rules and regulations relating to safety in the workplace.
- Can prove their ability.

The legal representative of the company owning the vehicle must appoint these persons for the task.

The operator is also responsible for:

- Not allowing anyone to approach the machine when it is working.
- Not allowing unauthorised and untrained persons to operate the machine.
- Following daily the safety procedure learned during the training course.
- Recognising and avoiding potential dangers in the workplace.
- Understanding the warning notices and following their instructions.
- Inspecting the machine and checking that it is working properly before starting work.
- Reporting any operating problems encountered before or while operating the machine.
- Avoiding reckless or careless actions that may endanger themselves or others.
- Always applying common sense and make safety an absolute priority.

If in any doubt about machine use, contact your local EUROCOMACH service centre who will provide you with all the necessary information.

⚠ WARNING

The purchaser and operator of this vehicle must read the user manual carefully before using this machine for the first time.
If the vehicle is supplied with a usage contract or is subject to a rental arrangement, the owner must ensure that the new user reads and understands the user manual. Also make sure that the new operator has inspected the vehicle from all sides, is familiar with all the decals and equipment and has tested all of the controls to establish their proper use.

At the time of the initial sale, the vendor informs the purchaser regarding the requirements for safe vehicle use and operation. If the vehicle is to be used by any person other than the initial purchaser, e.g. an employee, or is to be hired out, lent or sold to anyone other than the purchaser, ensure that the new operator reads and understands the **User Manual** supplied with the hydraulic mini-excavator before using the machine for the first time.

3.0 Safety

3.1 Before starting work

- Only authorised persons may operate the machine.
- Read the instruction manual before using the machine.
- Wear suitable clothing.
- Inspect the machine carefully every day, or at every shift change, checking the exterior of the machine prior to starting it, so as to avoid causing any damage or injury to persons.
- Always fasten your seat belt before starting the machine.
- Familiarise yourself with location and function of all pedals, control levers, instruments and luminous indicator lights.
- Top up the fuel and oil with the engine turned off and in well-ventilated areas suitable for this purpose.
- Wear a safety helmet in order to protect your head.
- Test the luminous indicators before starting the engine.
- Carry out all the required checks as indicated.
- Never drive the machine while under the influence of alcohol, medicines or other drugs.
- Before starting the machine, check that there is no one within its range of action.
- When climbing on or off the vehicle, always do so facing the vehicle and making use of the either the steps and handholds provided, or the cab posts. Do not jump off!
- Never try to climb on or off the machine while it is moving.
- Do not use any of the controls as a handhold.
- Prior to climbing on or off the machine, always check whether the footplate, steps or handholds are slippery.

CAUTION

It is forbidden to make any modifications to the machine

- The machine may not be modified without the manufacturer's prior approval.
- Making any modifications without such approval will result in a reduced level of safety, thereby increasing the possible hazards. Effecting any modifications will not only negatively affect machine performance, but will also shorten its life.
- We accept no responsibility for any accident or failure resulting from modifications made without our permission.
- When needing to effect any modifications, first make enquiries at our offices or at our sales agent.

CAUTION

Anticipate any precautions with regard to optional parts and accessories

- Do not fit any item or accessory to the machine that has not been approved either by our company or our sales agent.
- The use of parts or accessories not approved by our company will result in a reduced level of safety, thereby increasing any possible hazards.
- We accept no responsibility for any injury, accident, or machine failure resulting from the use of any parts or accessories not approved by us.

3.2 Working area – danger zone

The **WORKING AREA** is defined as the area around the machine where only those people responsible for the machine and who understand the operational abilities of the machine may operate.

The working area must be suitably signposted, even if the site area is already marked off.

When operating on a construction site, be aware of other machines operating in the vicinity and avoid encroaching on their range of action.

Within this area there is a zone where there is potential DANGER for whoever works there and that is, therefore, called the **DANGER ZONE**.

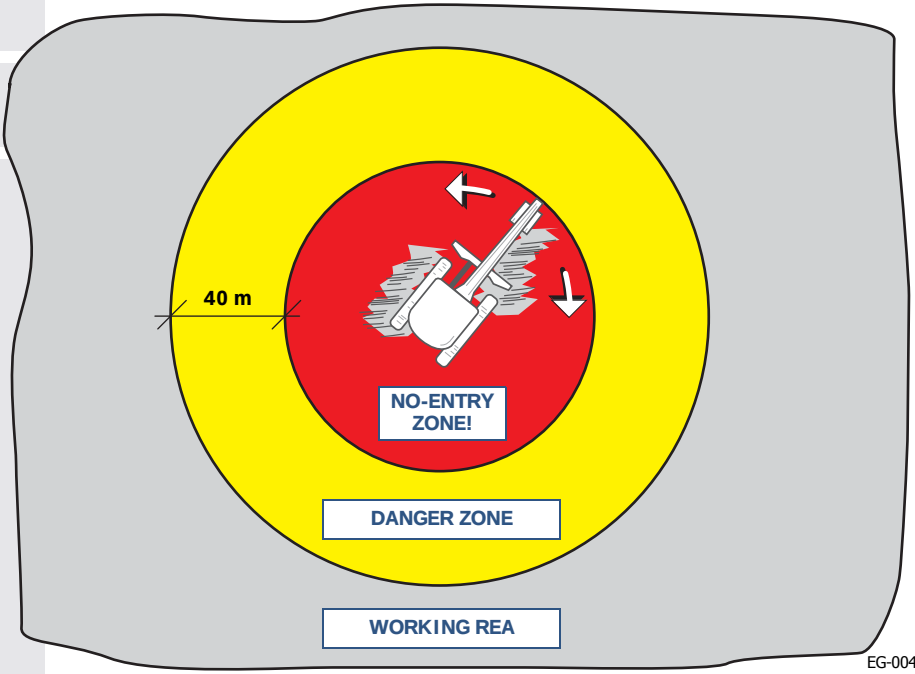
The **NO-ENTRY ZONE** is off limits to everyone while the machine is in operation.

DANGER

No one may loiter inside the no-entry zone around the machine.

The **PROHIBITED AREA** is deemed to be that area around the machine where you could be struck by moving parts during operation, by a load falling accidentally or where you are within range of the moving machine or its working parts or accessories.

Each machine has decals, marked with long-lasting text, which clearly indicate the danger deriving from standing within the machine's range of action.



IT IS FORBIDDEN TO STAY WITHIN THE NO-ENTRY ZONE (the machine's range of action).

The decals are an essential safety element and should therefore be kept legible and in good condition.

The driver should only operate the machine if there is **NO ONE** standing within the range of action.

The driver must warn anyone in the vicinity of the machine of the danger they are in.

This warning is usually given by sounding the horn on the dashboard, or by voice.

To avoid any accidental knocks or contacts when working near scaffolding or unstable structures, stay at a safe distance from them so that even an accidental manoeuvre will not result in contact with these structures.

3.3 Safety decals on the machine

There are self-adhesive plates stuck on the machine, bearing warning and safety symbols for the operator and anyone working near the machine; each decal is located close to the part of the machine where there is a potential risk.

Learn these symbols and what they mean before using the machine.

Check the presence and legibility of the SAFETY warnings daily; Repair or replace them immediately whenever they are damaged or missing.

⚠ WARNING

The manufacturer declines any responsibility for injury to persons or damage to property caused by failure to comply with the regulations and instructions on the plates or as a result of the plates being in a poor condition so they become illegible. Therefore, keep the plates in good condition so they are always legible and properly positioned; if necessary, order new plates from our Spare Parts Service.

1 - Wash the labels with soap and water and dry with a soft cloth.

2 - Replace any damaged or missing labels with original stickers obtained from your EUROCOMACH service centre.

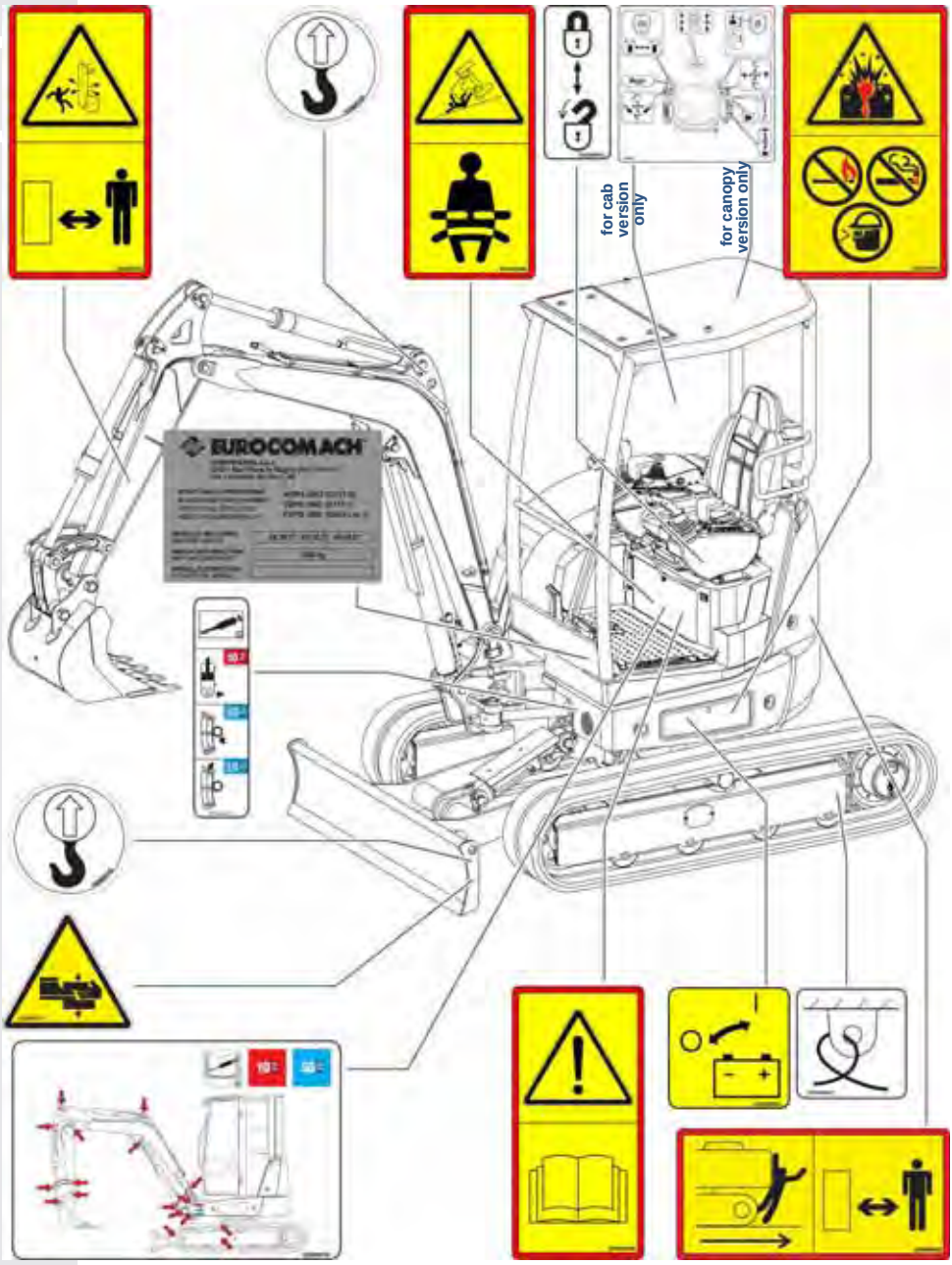
3 - Should a part with safety and warning labels be replaced with a new part, make sure that the same labels appear on the new part.

4 - When replacing labels, make sure that the application surface is clean, dry and free of oil or grease. Squeeze any air bubbles toward the outside edges.

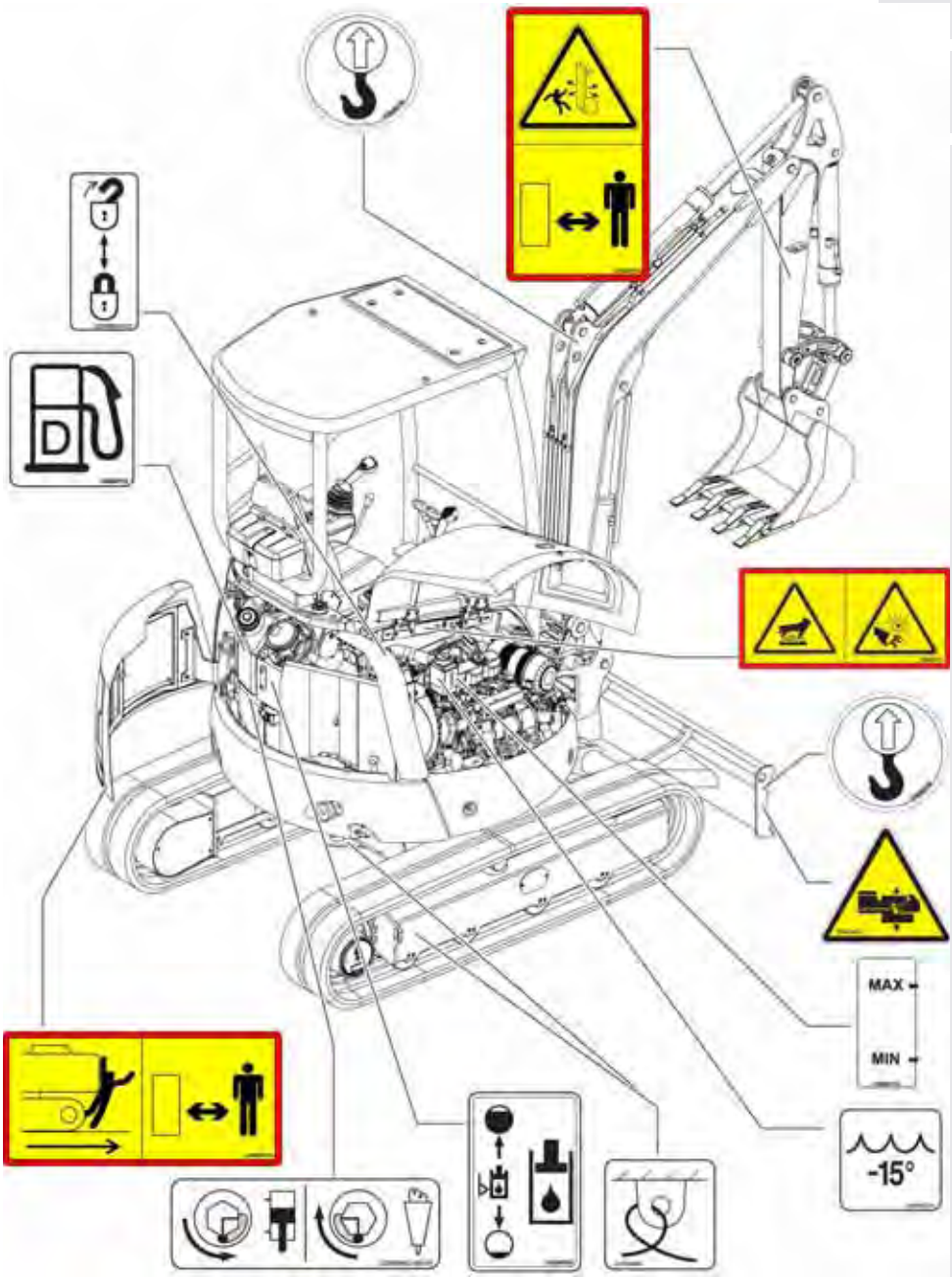
The decals applied to the machine relate to three different types of operations:

- safety decals;
- operational decals;
- maintenance decals.

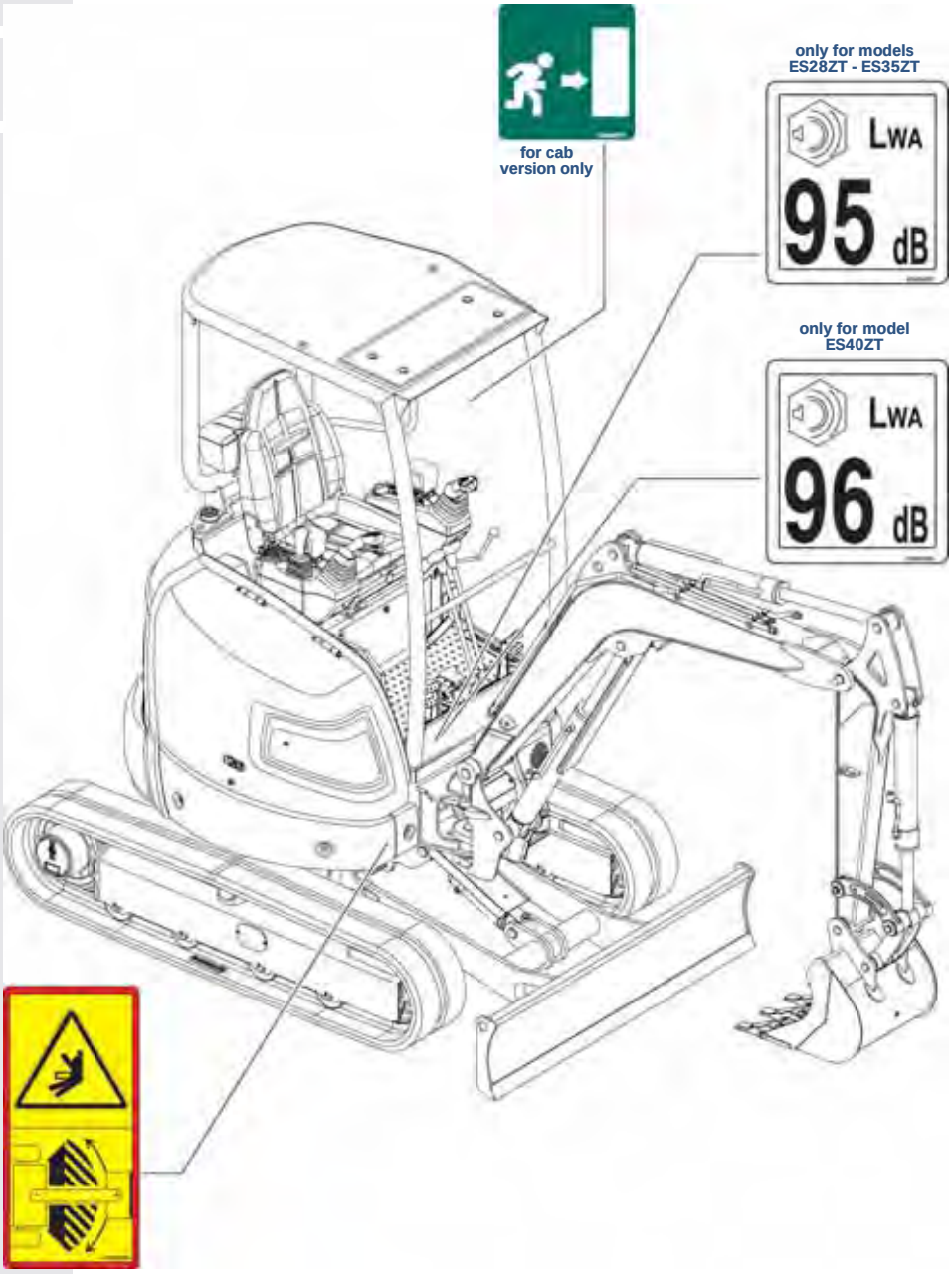
There follows a series of illustrations showing the location of the decals; on all three models the decals are positioned in the same way.



ES2-0050



ES2-0060


for cab version only
only for models ES28ZT - ES35ZT
LWA
95 dB
only for model ES40ZT
LWA
96 dB

ES2-0070

Key for safety decals

Caution:

Read the use and maintenance manual before operating the machine, in order to avoid risk or injury.

EG-0050

Caution:

Always wear the seat belt when operating the machine. If the machine overturns, do not abandon the driving position but hold on firmly to the seat.

EG-0060

Caution: Hot surfaces

Keep hands and arms away from hot surfaces.

Danger: Shearing

To avoid any risk of injury, make sure the engine is stopped be fore working on any part inside the engine compartment.

EG-1060

Danger: Stay clear of the rear of the machine

To avoid any risk of injury, stay well away from the machine's turning circle.

EG-0080

Danger: Stay clear of the front of the machine

Do not stand or allow anyone to ge t within the range of action of the machine, particularly the area of the boom.

EG-0090

Danger: Stay clear of working equipment

To avoid any risk of injury, stay well away from the range of action of the boom, dipper stick, bucket and any other equipment.

EG-0100

Danger: Fire – Explosion

Do not approach the machine with flammable materials and, above all, do not go anywhere near the tanks and the battery.

EG-0110

Danger: Crushing

Stay well away from the ma chine in order to avoid any possibility of limbs being crushed.

EG-0120

SAFETY EXIT:

Indicates the emergency exit in the event of the machine tipping over or if the main exit is obstructed for any other reason (see page41).

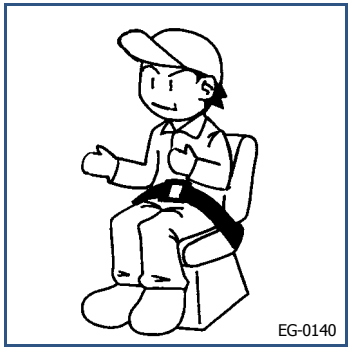
EG-0340

3.4 List of hazards

DANGER

SEAT BELT NOT FASTENED

Choose the most comfortable driving position according to your own build. Adjust the position of the seat and the control levers. Adjust the seat belt tension so that it restrains the operator at hip level, leaving the abdomen completely free. Do not commence work until the abovementioned safety conditions have been checked.


EG-0140

DANGER

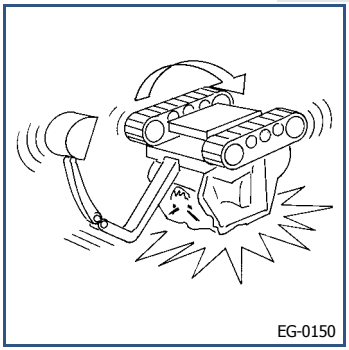
TIPPING OVER

The excavator's centre of gravity moves depending on the size and position of the load , the slope of the ground and the movement of the machine.

Analyse and memorise the topography and geological features of the site in order to take suitable preventive measures against possible overturning of the machine against landslips or slides. Level the ground in the machine operating area.

Reckless operating and driving procedures not suited to the type of machine may cause the excavator to tip over.

Never exceed the vehicle's rated operational lifting capacity (see the applicable tables in point 4.0).

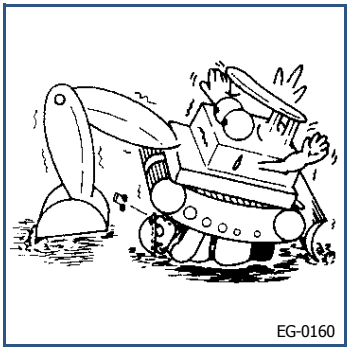

EG-0150

DANGER

CRUSHING OR SERIOUS INJURY

The excavator remains, to all intents and purposes, a machine and, therefore, when operating the machine, pay particular attention to any people, animals or objects appearing in the vicinity of the working area.

Before reversing, rotating and/or lifting the boom, always make sure there is enough space to operate safely.


EG-0160

Do not stand under the working equipment.

- Nobody may stand under the working equipment.
- When the machine is lifted using the working equipment, do not stand under the machine itself under any circumstances.

Sudden or normal descent of the machine's boom can lead to serious accidents, with the possibility of injury or even death.

DANGER

INTOXICATION

Exhaust gasses produced by the engine of the excavator, if inhaled directly and continuously, may be extremely dangerous and/or lethal for the human body. If work must be carried out in enclosed areas, take all possible precautions to ensure the circulation of fresh air and protect the respiratory tract by wearing a suitable mask.

EG-0170

Avoid inhalation or contact with battery acids, which are extremely toxic and may cause serious burns.

Explosive fuel.

The fuel used for the engine is flammable and may therefore cause fires and/or explosions. Avoid hazardous situations by keeping sparks, naked flames and materials for smokers well away from the vehicle and from the fuel when filling the tank or when servicing the fuel system. Find out where the work-site fire extinguishers are situated and how to use them.

DANGER

SHEARING OR TRAPPING OF HANDS

Certain parts of the excavator house components that may cause serious injuries to limbs.

It is strictly prohibited to place any parts of the body into these components when the machine is running.

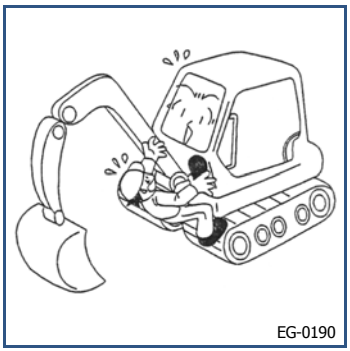
Wear appropriate clothing that cannot become entangled in any of the machine's moving parts.

EG-0180

CAUTION

DANGER OF SLIPPING

- Be sure to check the steps and handrails. Should any damage, looseness or any other abnormality be encountered, repair it.
- If there is any slippery substance such as oil or grease on the steps, handrails and tracks, remove it completely.



EG-0190

CAUTION

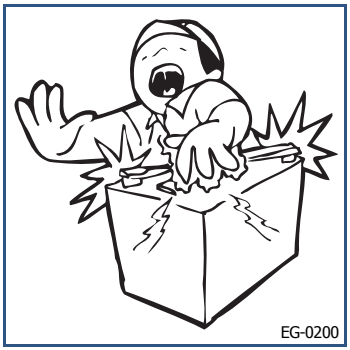
ELECTRICAL HAZARD

Only a skilled person may carry out any typeof work on the machine's electrical system or battery.

Before working on the electrical system, disconnect the battery, starting with the earth terminal.

Ensure t hat t he electrical co nnection wires and terminals do not show any signs of corrosion, cracking or scorching; if not, contac t your local EUROCOMACH service centre.

Never approach any overhead electrical cables with the boom.


EG-0200

CAUTION

DANGER OF SHORT CIRCUIT

Starting the machine by hot-wiring is prohibited.

- Do not, under any circumstances, start the engine by short-circuiting the starter terminals or battery.
- The machine may move suddenly,creating a hazardous situation and, in addition, the electric system may be damaged.

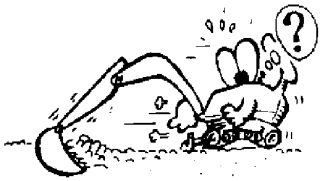
EG-0210

CAUTION

DAMAGE HAZARD

Before starting work in a new area, check for the presence of any electrical power lines, pipelines and telephone lines.

All these items are a source of danger for the careless operator, and damaging them is a potential economic cost.



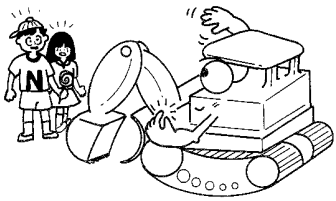
EG-0220

CAUTION

TRANSPORT OF PERSONS PROHIBITED

The excavator is not approved for carrying persons. Only the operator may be in the driving position.

Do not allow any unauthorised persons, particularly children, to approach the excavator while it is working.



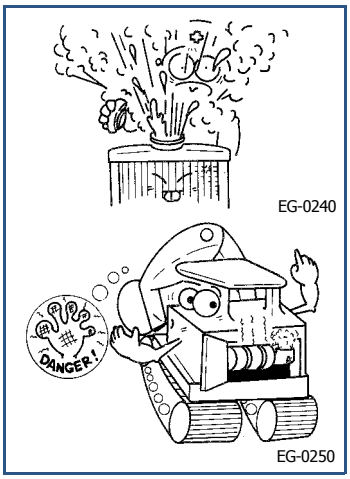
EG-0230

CAUTION

DANGER OF BURNS

Do not remo ve the cap from a hot radiator. The radiator cap may only be removed after the boiling hot liquid has cooled sufficiently. The latter could c ause injury.

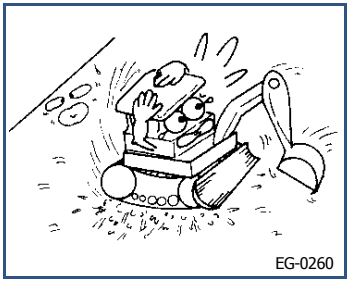
Do not touch the exhaust pipe immediately after turning off the engine. A hot exhaust system may cause physical injury.



CAUTION

HAZARDOUS WORKING CONDITIONS

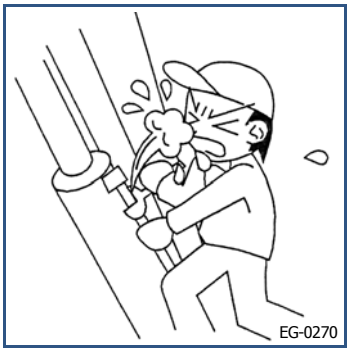
Beware of hazards. Always be aware of where you are. Look out for hanging tree bra nches, ca bles, recesses and overhangs.
Take care when wo rking a longside reservoirs, tracks, embankments a nd slopes. Keep well a way fr om cliff-edges.
Take ca re when wor king under overhangs. Do not undermine them. Beware of rock falls and landslides. Landslides can be hazardous.
Take care when bac kfilling. Do not go too close to edges. The weight of your equipment may cause the edge of the ground to give way.
When excavating on a slope or in a tunnel, beware of falling materials, for example, falling rocks.



The accessories may not be used in:
- areas at risk of fires;
- corrosive atmospheres;
- explosive atmospheres;
- areas containing dust that may constitute a health hazard for the operator;
- closed environments;
- densely populated area s (resident ial are as, etc .) witho ut fir st ha ving ta ken the necessary safety precautions.

CAUTION

PRESSURISED FLUIDS



The hydraulic system is pressurised whenever the engine is running and may maintain its pressure even after switching off.

Move all hydraulic system control levers and other controls after finishing work.

If fluid penetrates the skin or gets into the eyes, seek medical attention immediately.

Hydraulic oil

Hot hydraulic fluid causes serious burns. Wait for the fluid to cool before disconnecting any hydraulic lines. Pressurised fluid leaks may be invisible. **NEVER** use your hands to check for leaks. Use a piece of cardboard or paper for this purpose. Wear gloves to protect your hands from any oil splashes.

NEVER try to repair or tighten any hydraulic hoses or joints with the machine's pneumatic system under pressure. **STOP** the engine, release the load from all the cylinders and vent the pressure from any accumulators present in the machine's system. Pressurised hydraulic oil can penetrate the skin and may cause permanent damage to the eyes. Wear suitable goggles when performing any maintenance or servicing the vehicle.

Should any fuel or oil leakages occur, stop machine operations immediately and carry out the necessary repairs.

LUBRICANT under high pressure

- The grease cylinder that adjusts the track tension is pre-packed with grease, which may itself be under high pressure. In this situation, if the plug is loosened carelessly, both the plug and the grease could be forced out, creating a dangerous situation.
- When reducing the pressure by turning the cartridge valve (lubrication valve), do not turn the valve by more than one turn.
  The person performing this operation must not face the front of the cartridge valve, nor put his face close to it.

Do not disassemble the recall spring, as this may lead to a serious accident resulting in injury or death.

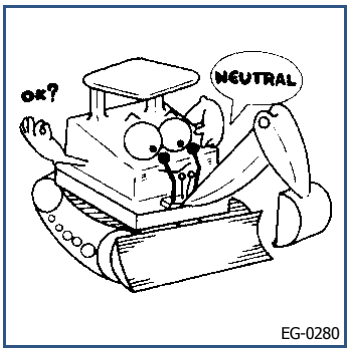
IMPORTANT

If the user or others are injured by contact with hydraulic oil or where the oil has penetrated the skin, immediately seek medical attention.
Failure to seek medical attention may lead to further serious injury.

⚠ WARNING

CONTROL NEUTRAL POSITION

Before starting the engine, always ensure that every pedal and operating lever is in the neutral position.



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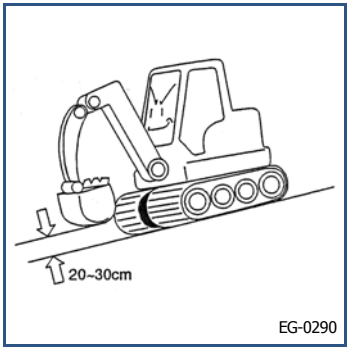
⚠ WARNING

CORRECT DRIVING PROCEDURES

When moving from one working zone to another, keep the boom and dipper stick in the retracted position.

When reversing, always look in the direc tion of travel of the excavator.

Watch out for other people ; should anyone enter the manoeuvring area, immediately stop the excavator.

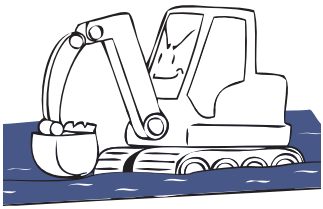


EG-0290

CAUTION

MAXIMUM IMMERSION DEPTH

Do not immerse the machine in water beyond the permitted depth (top of the track).
If there are any lubrication points in parts of the machine that have remained under water for a long time, grease them using the relative pump until grease seeps out from the junctures.



EG-1070

WARNING

CLOTHING AND SAFETY EQUIPMENT

Operators must wear clothing that is appropriate for work on the site: do not wear any chains, laces or other objects that may become entangled in moving parts of the machine. Clothes must not be greased or soaked with oil.

Wear protective clothing appropriate for the working conditions, such as:

- a helmet
- safety footwear
- safety goggles
- thick gloves
- ear defenders
- high visibility clothing
- waterproofs for bad weather
- respirator or filter mask.

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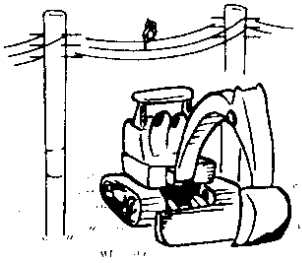
Wear whatever is necessary and do not take any unnecessary risks.

WARNING

BEWARE OF HEIGHTS

Check the size of doorways and the available space in the vicinity of any projections and obstruc tions. Be aware of the ma chine's overall dimensions, paying particular attention to the height of the boom.



EG-0310

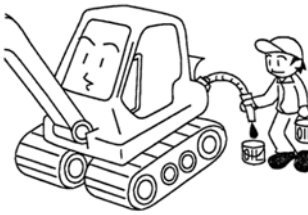
WARNING

DISPOSING OF FLUIDS

Improper disposal of waste fluids may c ause ser ious damage to the environment. Before disposing of waste fluids, contact the competent loca l bodies for information regarding the correct procedures.

Use suitable containers. Never use empty containers to store food.

NEVER pour oils out onto the ground, down drains, or into streams, lakes or dams. Adhere to the environmental protection regulations in forc e when disposing of oils, fuels, brake fluids, batteries and other waste materials.



EG-0320

- When discharg ing the following toxic subs tances, observe the specified rules.
  - Oil and lubricant,
  - filters,
  - battery,
  - coolant liquids,
  - other toxic substances.

WARNING

PROPER MAINTENANCE

Use the correct tools, make sure that spanners and tools are in the correct position. Treat machined and polished surfaces with care.

Engine parts that turn at high speed must be inspected for cracks and other damage during repairs and replacement.

Faulty parts may break and emit splinters causing injuries or death.

Never re-use broken, damaged or badly worn parts.

Tighten all bolts, unions and accessories to the torques specified in the specific sections.

Replace all guards and covers.

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3.5 Safety procedures

1 - UNAUTHORISED MODIFICATIONS

- No modification may be made to the machine without Eurocomach's approval, since modifications may involve certain hazards.
- Consult your EUROCOMACH service centre before making any modifications. Eurocomach cannot accept any responsibility for injury or damage resulting from unauthorised modifications.

2 - SEAT BELT

Always adjust the seat and fasten the seat belt securely before starting the engine.

Follow the appropriate instructions contained in the applicable point 7.4.

3 - CHECK FOR ADEQUATE VISIBILITY BEFORE STARTING TO OPERATE

Ensure that the work area is fully visible.

- Wipe all floor surfaces, levers, handrails, windows, and lights in order to ensure visibility.
- In the event that the windscreen is dislodged or broken, do not operate the machine until repairs have been carried out.

Inspection of safety devices.

- Check all safety devices including the locking lever and guards to make sure they are properly installed, function properly and are undamaged. If any problem is encountered, carry out the necessary repairs.
  Improper use of the safety devices will lead to serious accidents that may result in injury or death. Be sure to use all safety devices correctly.

4 - PRE-START INSPECTIONS

Carry out all the required pre-stat inspections. Should any problem be encountered, carry out the required repairs to the machine immediately. Using a faulty machine may cause an accident.

Always warm up the machine before starting work.

5 - CHECK THE SURROUNDING AREA PRIOR TO STARTING UP.

Look around you to ensure that the surrounding are is safe prior to starting up. Fasten the seat belt securely prior to starting the engine,. Do not carry out any maintenance work whilst the machine is held off the ground by means of the dozer blade or dipper stick.

6 - SIGNAL BEFORE STARTING UP

Before starting the engine, travelling or swivelling, always signal your intentions to other workers by means of the horn, etc.

7 - ENTRY/EXIT FROM THE MACHINE

DO NOT get off the vehicle until you have done the following:

- close the bucket, retract the dipper stick and completely lower the digging boom.
- stop the engine and remove the ignition key,
- raise the servo-control cut-out lever;
- unbuckle the seat belt;
- exit from the vehide, climbing out backwards and using the handholds provided very calmly;
- Do not jump down from , or onto the machine, either when it is stationary or in movement.

Do not get on and off the operator's seat by holding on to the work equipment control levers.

Do not jump on or off the machine: ensure that both hands and one foot, or both feet and one hand are resting on the machine at all times.

Do not get on or off the machine while it is in operation as this could pose a danger; the machine may overturn or the tracks may break, posing the risk of a serious accident and a consequent risk of injury or death.

Tighten the bolts that secure the handles if they become loose and clean the driver's floor area if it becomes dirtied with oil, grease or mud.

8 - CHEMICAL HAZARDS

- Exhaust Fumes

Fumes from the engine exhaust may lead to injury or death.
DO NOT operate the vehicle in an enclosed area without a ventilation system capable of extracting the hazardous fumes.

- Battery

The following WARNING is intended to supplement rather than replace the warnings and information provided on the battery by the battery manufacturer.

When jump-starting the vehicle, adhere strictly to the instructions provided in the point 7.10 contained in this manual.

This vehicle is equipped with a lead-acid battery. Batteries of this type contain an acid electrolyte and generate explosive gases. Never create sparks or flames, or smoke near the battery. Incorrect procedures may lead to contact with the battery electrolyte and result in serious chemical burns to the eyes and skin, or damage to clothing.

Always wear safety glasses and proper protective gear when performing any maintenance work or servicing the battery.

FIRST AID FOR BATTERY ELECTROLYTE

External contact - Flush with water

-Eyes - Flush with water for at least 15 minutes and seek medical attention immediately!

- Swallowing- Drink large quantities of water, followed by milk of magnesia, beaten egg or vegetable oil. Seek medical attention immediately!

IMPORTANT

In case of swallowing, DO NOT administer any fluids that induce vomiting!

9 - MOVING PARTS HAZARD

DO NOT place limbs or other parts of the body close to moving or rotating parts of the vehicle during operation. Failure to comply with this warning may lead to serious injury or death due to crushing or amputation.

STOP the engine and wait for all moving and rotating parts to come to a standstill before carrying out maintenance work or other service activities on the vehicle.

10 - MACHINE INSPECTIONS AND MAINTENANCE

Stop the engine before commencing with any inspection and maintenance work on the machine.

- It is extremely hazardous to carry out inspections or maintenance work while the engine is running. Ensure that the engine has been stopped beforehand.
  Only commence with the task after every device in the engine compartment has cooled down.

Inspection and maintenance operations with the engine running

- In the event that maintenance tasks need to be performed with the engine running, set the locking lever to the "Locked" position and be sure to perform the work with two or more workers, including one assistant.
- The assistant should sit in the operator's seat so that he can immediately turn off the engine in an emergency.
  In this case, do not touch any lever other than the one required.

11 - TRACK ADJUSTER PRESSURE RELIEF SYSTEM HAZARD

ALWAYS follow the instructions contained in this manual when adjusting the vehicle's track tension. The track adjuster unit contains grease under very high pressure. Grease may escape and penetrate the skin unless the proper procedures are followed and suitable protective shields and clothing are worn.

12 - PREPARATION AND PREVENTION

Know the location and function of all vehicle controls.

Before starting the engine, make sure that all persons have been cleared from the work area and that you are not activating any of the control levers or pedals.

Holes, obstructions, debris and other work area related hazards may cause injury or death. Always inspect the work area, taking care to identify the hazards before operating the vehicle.

Avoid hazards when you move the vehicle around the worksite. Know the rules for movement of people and vehicles on the worksite. Comply with all signals and signs.

DO NOT operate the vehicle unless:

- all equipment is in working order,
- all covers are in place;
- all warning decals are in place and legible.
  Replace all missing, illegible, or damaged warning decals.

When you operate the vehicle on a road or highway, use accessory lights and devices to warn other vehicle drivers. Comply with all applicable local laws and regulations.

13 - Vehicle Stability

When the turret and/or digging boom assembly is at a 90° angle to the front or rear of the undercarriage, vehicle stability is at its lowest point.

Vehicle tip-over caused by improper loading or operation is more likely to occur with the vehicle in this position.

To provide maximum vehicle stability while working:

- Whenever possible, position the vehicle so that the tracks are parallel with the turret and boom assembly;
- keep the dozer blade lowered and in contact with the ground.

14 - Operation on Slopes

Travelling or working on any slope can be hazardous. Ascend or descend slopes slowly and cautiously. Unexpected obstacles or changes in gradient can cause loss of vehicle control that may result in tip-over.

When travelling on a slope with an angle less than 15°, always reduce vehicle speed and maintain a slow, steady motion. Apply braking by smoothly returning both travel control levers to the NEUTRAL position.

If travel on a slope with an angle greater than 15° is required, take the following additional precautions:

- only travel straight up or down and NEVER across steep slopes;
- The front of the vehicle must always face the DOWNHILL side of the slope;
- Position the dozer blade in front of the operator, to the front of the vehicle and keep the dipper stick assembly facing straight ahead;
- Once travel has begun, maintain a maximum clearance of 30 cm between the bucket bottom and ground at all times.

If working on a slope with an angle of less than 15°, position the dozer blade to face the DOWNHILL direction before lowering it down to the ground.

DO NOT work on a slope with an angle greater than 15° without first levelling the work area.

DO NOT park the vehicle or leave it unattended on a slope at any time.

15 - TIPPING: RISKS

The centre of gravity of the excavator shifts when the vehide is operated on rough ground or slopes, and when loads are lifted and lowered.

Keep the vehicle under control at all times. When travelling, plan the direction in which the vehide is to move. Avoid making any jerky turns, starts, or stops. Travel with extreme caution and at the slowest possible speed.

DO NOT exceed the vehicle's rated operating load capacity (see the corresponding tables in point 4.0), since failure to adhere to the specified limit values may result in the vehicle becoming unstable and in dangerous operating conditions.

IMPORTANT

Travelling with an extended load is dangerous and could cause the vehicle tip-over. If it is necessary to travel with a load, keep the load as close to the vehicle as possible and maintain a maximum clearance of 30 cm between the bottom of the load and the travelling surface.

The protective structure (cab or canopy) makes the driver's position the only safe place to be if the machine should overturn.

During overturning:

- - KEEP THE SEAT BELT FASTENED
- NEVER LEAVE THE DRIVER'S SEAT
- REMAIN SEATED, HOLDING FIRMLYONTO THE SEAT WITH YOUR HANDS BETWEEN YOUR LEGS
- - LEAN AWAY FROM THE POINT OF IMPACT

Once the machine has stopped tipping:

- Ensure that the machine is stable and will not tip any further;
- unbuckle the seat belt;
- quickly exit from the driving position via the side of the machine that is facing upwards.

Do not try to leave the machine by sliding out under the protection structure. If the main exit route is obstructed, use the emergency exit.

Emergency exit (cab version)

If the vehicle is fitted with an enclosed cab, the emergency exit is via the front windshield, which can be opened completely and is indicated by the decal in the figure.

If the front windscreen mechanism is jammed, break the glass with the hammer provided (see point 7.7.8).

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16 - Using the machine on decks or raised surfaces

Always check the space available for movement, as well as the size and load-bearing limitations of the work area. Should it be necessary to work on any form of deck or raised surface, always check the load-bearing capacity beforehand. Pay particular attention to the machine rotation radius.

17 - Passenger transportation hazards

DO NOT allow anyone to ride on the vehicle with the operator.

DO NOT use the vehicle as a man hoist or working platform.

18 - Clearances

Always check overhead and side clearances carefully before driving around or under any fixed structures, such as buildings, bridges, towers, etc.

19 - Underground Hazards

Know the location of all underground hazards before operating the vehicle in a new work area. Contact with electrical cables, telephone lines, gas or water pipes, sewers, or other underground utilities may lead to injury or death. Before starting work, contact your local telephone service supplier and request them to locate and mark these utilities.

20 - Electrocution Hazards

NEVER operate this vehicle in an area where there are overhead or underground power lines, cables, or other power sources, without first requesting that the appropriate power or utility companies isolate the lines or taking other adequate precautions.

Electrical components have a very low water tolerance.

Infiltration of water into the various sensors, connectors or electrical system components may result in malfunctions. Do not clean the machine using steam and water.

21 - Visual Obstructions

Dust, smoke, fog, etc. can decrease vision and cause an accident. Always stop or slow the vehicle down until the obstruction clears and the work area is once again clearly visible.

22 - Movement over frozen or snow-covered surfaces

If work must be performed on surfaces coated with ice or frozen snow, reduce speed and avoid making any jerky movements. Sideways sliding may easily occur and machine functions become more sensitive.

When a large amount of snow has fallen, the road edges and any equipment provided are difficult to see. Exercise extreme caution in such situations.

Frozen ground will often get softer as the temperature rises. Exercise extreme caution in such situations.

23 - Work Site Conditions

Before commencing work, carefully analyse and take into account the topography and geological features of the work site in order to take proper precautions to prevent the machine from overturning and the earth/soil from collapsing.

Certain other conditions may also affect the work site. People may enter the area, or equipment and material may be moved away or brought in. Always be aware of the existing conditions on the work site and always look in the intended direction before starting any movement.

Do not commence with any task before confirming the safety conditions.

24 - Ventilation

Good ventilation is very important when operating this vehicle. Sparks from the electrical system and engine exhaust may cause an explosion. Carbon monoxide fumes from the engine exhaust can cause suffocation in an enclosed area. DO NOT operate this vehicle in an area containing flammable dust or fumes. Provide good ventilation and wait until the hazard has been eliminated.

25 - Unusual noises emanating from the machine

During operation, be aware of any unusual noises emanating from the engine, hydraulic devices, transmission components, working equipment, etc.

The following may be deemed to be unusual noises.

- Is there any squeaking sound as a result of insufficient lubricating oil?
- Is there any scraping sound?
- Is there any unusual vibration or rattling sound?
- Is there any spluttering sound?
- Is there an unusual sound coming from the hydraulic devices?
- Is there any regular knocking sound?
- Is there any rumbling sound?

If any of these sounds are detected, stop the machine at once and carry out an inspection.

26 - Keep the area around the operator's seat clean

- Always keep the cab and access ways clean.
- Do not climb into the machine with soiled or greasy boots.
- Do not place anything at the foot of the operator's seat or around the pedals, and refrain from hanging anything from the control levers.
  These control levers may be engaged accidentally, causing the machine to run away or the work equipment to be activated, which constitutes a danger.
- Stow away any items not required for the current operations in their proper places.

27 - Precautions for welding repairs

- Have a fire extinguisher at hand in the area where the welding repairs are being carried out.
- Only qualified persons may be permitted to weld.
- Welding operations may only be carried out in an area equipped with a good ventilation system.
- Before beginning to weld, remove any paint from the surface of the part to be welded.
- Do not weld or gas-cut any pipe containing a combustible solution: this may cause a fire or an explosion.
- Only begin with welding or gas cutting after having cleaned the area with a non-flammable solution.
- When any welding repair work is being carried out, the heat generated may scorch the paint and hazardous gases may be released.

28 - Prevention of fuel and oil fires

Fuel, oil and some types of anti-freeze are highly inflammable if they come into contact with a naked flame; fuel is particularly inflammable and therefore highly dangerous.

- Keep naked flames well away from inflammable liquids.
- Shut down the engine and do not smoke while filling up with fuel.
- Only fill up with fuel and oil with the engine shut down, and in well-ventilated areas.
- Dedicate a clearly marked area for filling up with fuel and do not allow access to any unauthorised persons.
- When filling up with fuel, keep a firm grip on the spout and always keep it in contact with the intake until filling is complete, so as to prevent any sparks due to static electricity.
- After filling, carefully tighten the safety caps on the fuel and oil tanks.
- Never fill the tank completely; leave room for the fuel to expand.
- Dry up any fuel spills immediately.
- Do not heat up fuel tanks or hydraulic devices or bring any naked flames near them: this constitutes a fire hazard.
- Keep fuel and oil in appropriate containers and store them in a safe place, with access restricted solely to persons authorised to handle these materials.

29 - Storing the vehicle

Ensure that you remove the key.

Before leaving the machine, lower the bucket and the dozer blade to the ground. Stop the engine and remove the key. Cover the swing and PTO pedals.

Park the machine on a level surface.

Select a safe and level surface when parking the machine. If it is necessary to park on a slope, block the tracks with chocks at right angles to the slope. Drive the bucket teeth and the dozer blade into the ground.

After operation, inspect the entire machine and lubricate.

30 - Precautions to be taken while operating

- This vehicle has been designed primarily for digging and backfill operations.

IMPORTANT

All the capacity ratings are based on the assumption that the machine is resting on firm, level ground. Should the machine be operating in conditions that differ from those above (for example, loose soil or uneven ground, on an incline, with lateral loads), the operator must take this factor in to account and reduce the load accordingly.

- **ALWAYS** lower the dozer blade before commencing with any task. Operator safety, maximum load ratings for the digger, and vehicle stability are dependent upon lowering the dozer blade whenever the vehicle is active in any work situation.
- The vehicle's hydraulic system is equipped with an accumulator that allows limited operational control in the event of any loss of normal hydraulic system pressure. Before maintenance or service of any type is performed on any component of the hydraulic system, it may be necessary to first discharge the accumulator. Contact your authorised Eurocomach Service centre for assistance.

In the event that any fault or malfunction is encountered with any of the vehicle controls or features, STOP the vehicle immediately and contact the authorized EUROCOMACH Service centre for assistance.

- Do not try to crush concrete or boulders using the sideways motion of the bucket.
- Do not allow the bucket to free-fall when digging.
- Do not extend the cylinders completely. Always leave a safety margin.
- When travelling down a steep slope, reduce speed to within a safety range using the travelling lever.

- Do not dig or use the bucket to hammer a pile into the ground.
- Do not attempt to start moving or to dig with the bucket dug into the ground.
- When scraping the ground, do not dig the bucket in too deeply. Instead, dig with the bucket at a fairly shallow level and far away from the body of the machine: this puts less strain on the bucket.
- This machine can be used in water as long as the turret is above the water level. Check that the engine exhaust is always above the water level, keeping a suitable safety margin.
- When travelling or transporting the machine with the boom folded, do not allow the bucket to come in contact with the dozer blade.
- After having operated in water or mud, always clean and inspect the machine and grease the pins on the bucket, the swing post, and any other parts that have been submerged.

DANGER

When operating near any overhead power lines, either barricade them off or apply insulating guards around them. In addition, it is extremely hazardous to operate in the vicinity of any high-voltage power lines: the driver could even be electrocuted when the machine makes contact with this line.

CAUTION

Digging with the machine facing the rear will prevent the boom cylinder from fouling against the dozer blade.

Do not use this machine to lift or move materials under any circumstances, se non con opportune e dedicate optional accessories, at all times following the specific warnings.

Do not move the boom rapidly, particularly downwards: the track frame may suffer damage.

Do not lift the machine with the turret turned from its normal travelling direction: or the machine may tip over.

Do not operate the machine with heavy loads while it is swinging, as this may damage the boom.

When working in areas of uneven ground, level the surface before starting work.

Ensure that the rear of the machine does not hit anything while turning.

Before starting work, always ensure that any ancillary accessory fitted does not interfere with the booms.

When digging deep, ensure that the cylinder of either boom does not accidentally hit the ground.

Do not attempt to move any rocks or similar items using the blade: this may damage both the dozer blade and the blade cylinder.

⚠ CAUTION

When lifting up the machine with the dozer blade, the machine supports must be on either side of the blade and not on one side only.

The dozer blade must not be used to increase stability/support, as there is no electrical cut-out or mechanical locking device present.

Do not undermine sheer cliff faces, as the edges may break away or the soil may give way, resulting in serious injury or death.

Do not lift, move or rotate the bucket above any person or above the truck cab. Loads dropping from the bucket or bumps against the bucket may cause serious injury or damage the machine.

3.6 Safety devices

3.6.1 Protective structure (canopy or cab)

The canopy and cab have been type approved according to the applicable laws and have passed the following tests:

- ROPS ISO 12117-2
- TOPS ISO 12117-1
- FOPS ISO 10262.

In the event of damage, contact Eurocomach so that they can check the strength level.

- **DO NOT** modify, repair or remove the operator protection structure.
  The protection offered by the protective structure will be compromised, creating a hazard that may result in death or serious injury if the structure suffers any structural damage or modification such as welding or drilling.

- The protective structure, driver's seat, seat belt and all mounting hardware must be carefully inspected after any type of accident. Any components showing signs of damage must be replaced. The replacement parts used must be original equipment, as listed in the Vehicle Parts Catalogue. These parts are available from any authorized Eurocomach Service Centre.

WARNING

Our machines are always supplied with an approved protective structure that is either open sided (canopy) or enclosed (cab).

The removal or modification of the protective structure is prohibited. It is prohibited to operate the machine with no protective structure in place.

3.6.2 - Seat belts

Seat belts are essential in the event of the machine overturning, as they will restrain the operator firmly in his seat. The condition, cleanliness and mechanical mountings of the seat belt must be checked regularly.

IMPORTANT

Inspections before starting

Before starting the engine or using the machine, the operator must fasten his seat belt, having checked that it is in good working order.

Operations before leaving the machine

The operator may only undo his seat belt once the engine has been switched off.

3.6.3 Servo-control cut-out lever

When raised, the servo-control cut-out lever cuts off the control circuit and prevents them form being activated accidentally.

The servo-control cut-out lever must be raised whenever the operator leaves the machine.

4.0 Technical information

4.1 Engine

MODEL	ES28ZT	ES35ZT	ES40ZT
Brand	KUBOTA		
Model	D1503-M		D1803-M
Power output (ref. 97/68/CE)	44.9 kW (33.4 hp) at 2260 rpm		48.4 kW (38.1 hp) at 2260 rpm
Displacement	1499cc		1826 cc
Bore	83 mm		87 mm
Stroke	92.4 mm		102.4 mm
Number of cylinders	3		
Cooling	electrolyte		
Fuel	Diesel		
Minimum rpm	1150 rpm		
Maximum rpm (under load)	2100 rpm		
Air filter	dry filter with safety cartridge		

IMPORTANT

As regards the description and the specific operation of the internal combustion engine, (injector pump, alternator, starter system), please refer to the engine operation and maintenance manual supplied with the machine.

4.2 Undercarriage

MODEL	ES28ZT	ES35ZT	ES40ZT
Undercarriage structure	FIXED, 'X' box-frame		
Lower rollers	4 RH + 4 LH - oil bath		
Upper rollers	1 - oil bath		
Idle wheels	oil bath		
Rubber tracks	280 X 86 X 52.5	300 X 88 X 52.5	350 X 88 X 52.5
Track tensioner	hydraulic adjustment by grease pressure		

4.3 Booms

MODEL	ES28ZT	ES35ZT	ES40ZT
Standard lifting boom length mm	2135	2260	2500
Standard digging boom length mm	1100	1200	1400
Optional digging boom length mm	1310	1400	1650

4.4 Dozer blade

MODEL	ES28ZT	ES35ZT	ES40ZT
Width	1550	1580	1700
Height	355	355	355
Height extension	345	350	330
Depth extension	495	497	506
Distance from swivel bearing centre	1432	1462	1432

4.5 General data

MODEL	ES28ZT	ES35ZT	ES40ZT
Operating weight including canopy and rubber tracks kg	2800	3150	3800
Operating weight, with cab and standard bucket kg	2950	3500	3950
1st and 2nd travel speeds Km/h	2.5 - 4.6		
Turret rotation speed rpm	9		
Ground pressure with canopy (with cab) kgf/cm²	0.30 (0.32)	0.31 (0.32)	0.32 (0.33)
RH boom swing	50°	50°	N.A.
LH boom swing	80°	80°	N.A.

The **total net weight** of the machine is the sum of the operating weight plus the weight of the bucket or the accessory fitted.

IMPORTANT

Always take the weight of the accessory or bucket fitted to the boom into account.

4.6 Performance

MODEL	ES28ZT	ES35ZT	ES40ZT
Jerk strain limit at the bucket. (standard boom) ISO 6015 Kgf	2400		3200
Breaking strain limit at the boom (standard boom) ISO 6015 Kgf	1950		1950
Traction strain limit Kgf	3400		
Traversable incline	60% - 30°		

4.7 Hydraulic system

MODEL	ES28ZT	ES35ZT	ES40ZT
Pump type	2 variable delivery pumps + 1 gear pump		
Pumping capacity	2 x 36 l + 33 l		
Operating Pressures: 1 - lifting boom, 2 - bucket, 3 - boom, 4 - travel	230 bar		
- Dozer blade	bar 210		
- Turret rotation motor	bar 195		
- Servo-controls	30 bar		
Total hydraulic capacity	105 l		
Auxiliary hydraulic capacity	68 L/min		
Hydraulic servo-controls for operational functions	3 joysticks + 1 control pedal		
Travel	hydraulic gear motors with axial pistons with "AUTO TWO SPEED" automatic speed changer Negative parking brake		
Turret rotation	hydraulic gear motor with axial pistons and negative parking brake		

4.8 Table of rated load capacities

DANGER

The machine is not designed for lifting loads and so such operations are prohibited.

The machine can be used for lifting loads once it is equipped with the devices prescribed by EN474-5 and all the national regulating laws are complied with.

The table of rated load capacities that follows has been drafted in accordance with the ISO 10567 standard.

The load capacities refer to:

- Machines positioned on virgin, firm and level ground;
- The indicated capacities remain valid for the full swivelling range of the turret;
- The indicated capacities refer to the bucket hinge pin;
- Reach from centre of swivel bearing;
- Max control valve pressure: 230bar;
- The indicated capacities refer to the machine configuration with non-articulated boom.
- The load capacities do not exceed 75% of the tipping limit or 87% of the hydraulic limit, in accordance with ISO 10567.

ES28ZT

MACHINE CONFIGURATION:

- one-piece, 2135 mm lifting boom;
- 1100 mm digging boom with cylinder and connecting-rod bucket leverage system;
- without bucket, quick-release attachment or other accessory fitted;
- standard ballast of 290 Kg;
- 280 mm rubber tracks.

REACH (m)	2.1	2.5	3	3.5	MAX
LOAD (kg)	800	620	500	385	320

ES35ZT

MACHINE CONFIGURATION:

- one-piece, 2260 mm lifting boom;
- 1200 mm digging boom with cylinder and connecting-rod bucket leverage system;
- without bucket, quick-release attachment or other accessory fitted;
- standard ballast of 425 Kg;
- 300 mm rubber tracks.

REACH (m)	2.1	2.5	3	3.5	4	MAX
LOAD (kg)	885	690	525	420	335	320

ES40ZT

MACHINE CONFIGURATION:

- one-piece, 2500 mm lifting boom;
- 1400 mm digging boom with cylinder and connecting-rod bucket leverage system;
- without bucket, quick-release attachment or other accessory fitted;
- standard ballast of 585 Kg;
- 350 mm rubber tracks.

REACH (m)	2.5	3	3.5	4	4.5	MAX
LOAD (kg)	1010	810	620	510	430	400

IMPORTANT

The capacities shown must be reduced depending on the type of bucket, quick-release attachment or other accessory fitted.

The capacities shown must be reduced depending on the slope and the ground adhesion conditions.

4.9 Standard equipment

- Canopy.
- Rubber tracks.
- Automatic parking brake on swing and traverse.
- Dual speed transmission with "AUTOMATIC SHIFT DOWN" (automatic gearshift from 2nd to 1st gear as the tractive effort increases).
- Standard digging boom
- Servo assisted hydraulic joysticks with electro-hydraulic proportional controls for:
  - boom swing;
  - single/double acting hydraulic system hose kit (e.g. hammer or auger);
- Unique ignition key operates all locks on the vehicle.
- Adjustable sprung seat and seat belts.
- Dry air filter with safety cartridge and electric blockage indicator.
- Use and maintenance manual, spare parts catalogue and tool kit.
- Storage compartment for maintenance tools and manuals, under the driving seat.
- Work light on the boom.
- Guard on raising cylinder and blade.
- Single and double acting auxiliary hydraulic circuit on digging boom (for accessories such as the hammer or swinging bucket)
- Parking brake on travel:
  - mechanical negative brake with automatic hydraulic release;
- Parking brake on rotation:
  - mechanical negative brake with automatic hydraulic release.
- Service brake on hydraulic rotation and travel.

4.10 Optional extras

- Cab complete with ventilation and heating, front windscreen wiper and washer, right and left wing mirrors, single-pole electrical socket on the roof for a rotating light.
- Steel tracks or rubber pads in steel/rubber.
- Long digging boom.
- Safety valves (main boom, dipper stick, bucket, dozer blade).
- Work lights and rotating light on the cab.
- Various accessories to be fitted to the digging boom (described in point 8.1.1)
- Safety stop valves on boom, dipper stick and bucket cylinders.
- Safety stop valves on dozer blade cylinder.
- EUROCOMACH - GEOSERVICE satellite monitoring system (with integral anti-theft alarm).
- Supplementary cast ballast:
  - 160 kg (rear swivel range 858 mm) ES28ZT.
  - 205 kg (rear swivel range 883 mm) ES35ZT.
  - 255 kg (rear swivel range 956 mm) ES40ZT.

4.11 Rotating structure

The excavator's superstructure (turret, booms) is able to rotate independently from the bottom section (undercarriage). This movement is permitted by the swivel bearing, which ensures the movement of parts with the minimum amount of friction. The swivel bearing consists of two rings free to rotate with each other; one is securely joined to the undercarriage, the other to the turret.

4.12 Fluid capacities

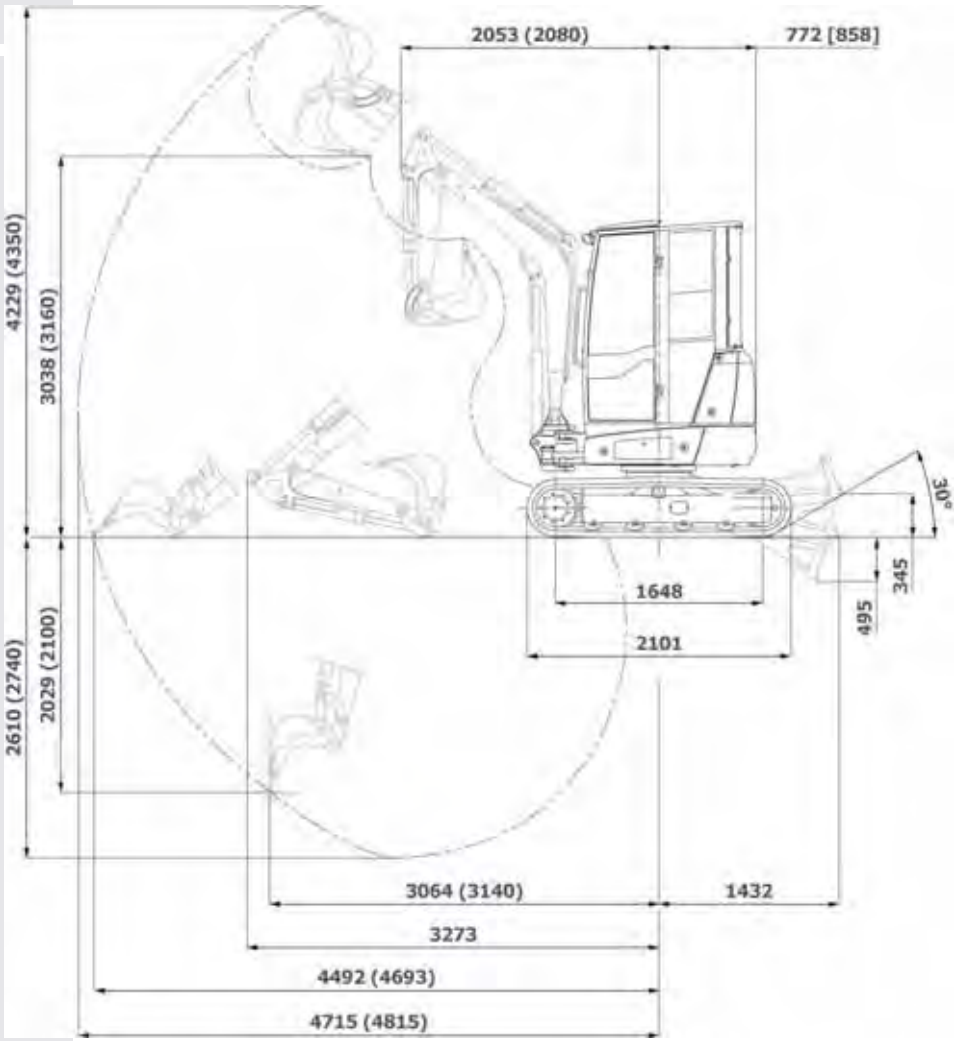
MODEL	ES28ZT	ES35ZT	ES40ZT
Engine oil with replaceable filter	7 l		
Fuel tank	30 l		
Cooling system	7.5 l		8 l
Hydraulic oil reservoir	30 l		
Electrical system	54 l		

4.13 Electrical system

Electrical system ..... 12V DC, negative earth
Lead-acid battery with liquid electrolyte..... 12V 80Ah/750 A
Alternator..... 12V 40 Amp
Starter motor (ES28ZT - ES35ZT) ..... 12 V 1.4 KW
Starter motor (ES40ZT)..... 12 V 2.0 KW

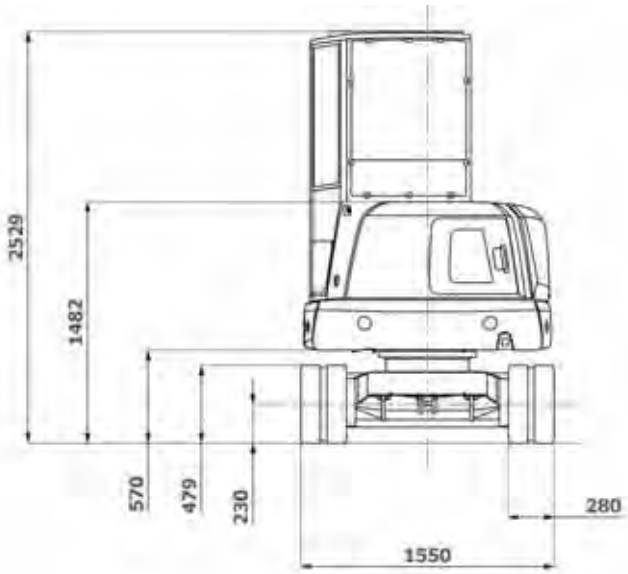
4.14 Vehicle dimensions (in mm) with standard bucket

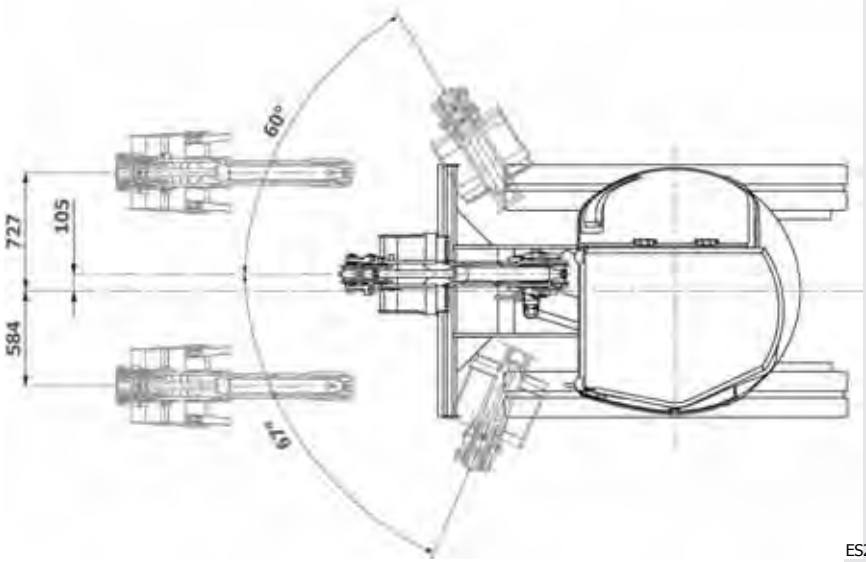
4.14.1 Model ES28ZT



Standard boom (long version)
Standard ballast [supplementary ballast]

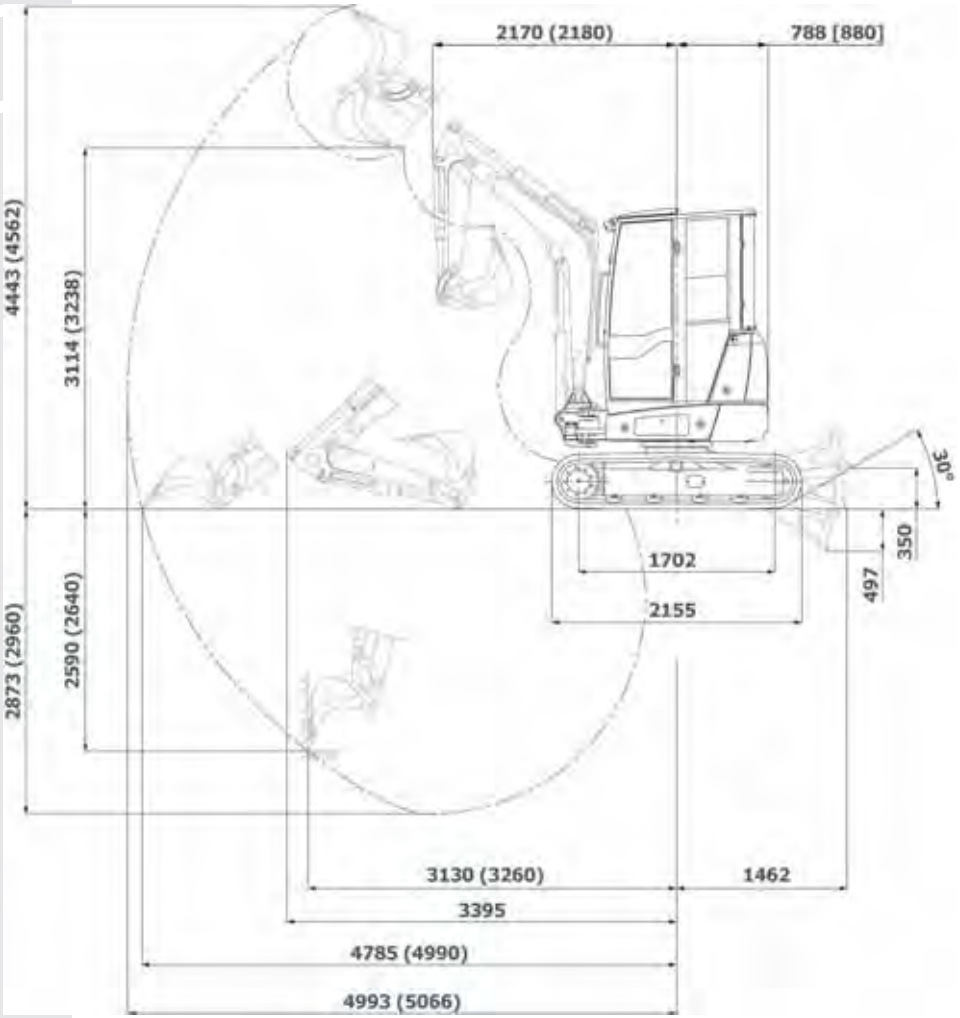
ES2-0090





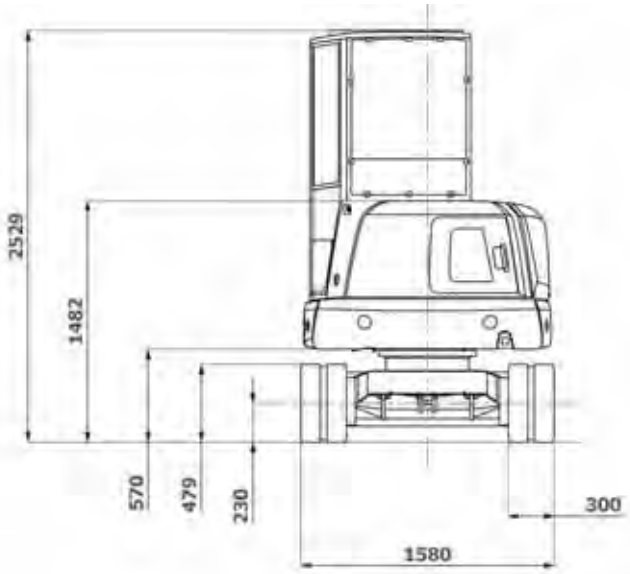
ES2-0100

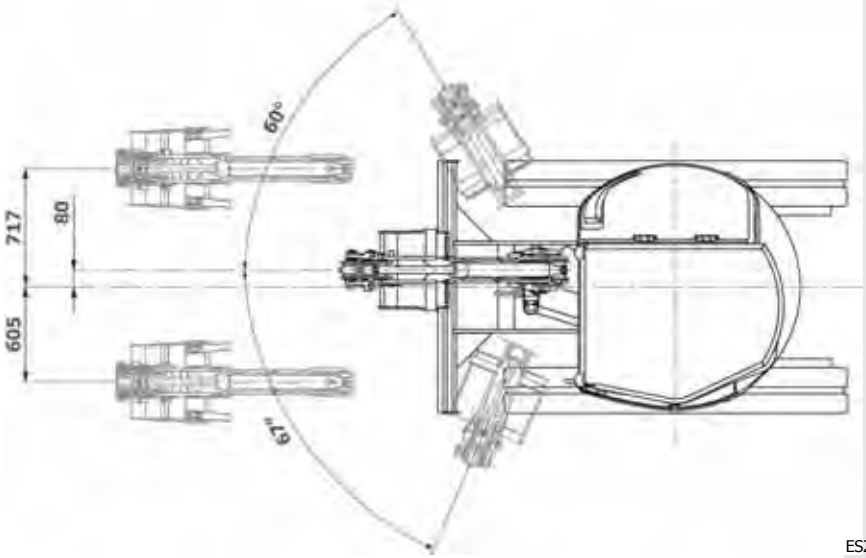
4.14.2 Model ES35ZT



Standard boom (long version)
Standard ballast [additional ballast]

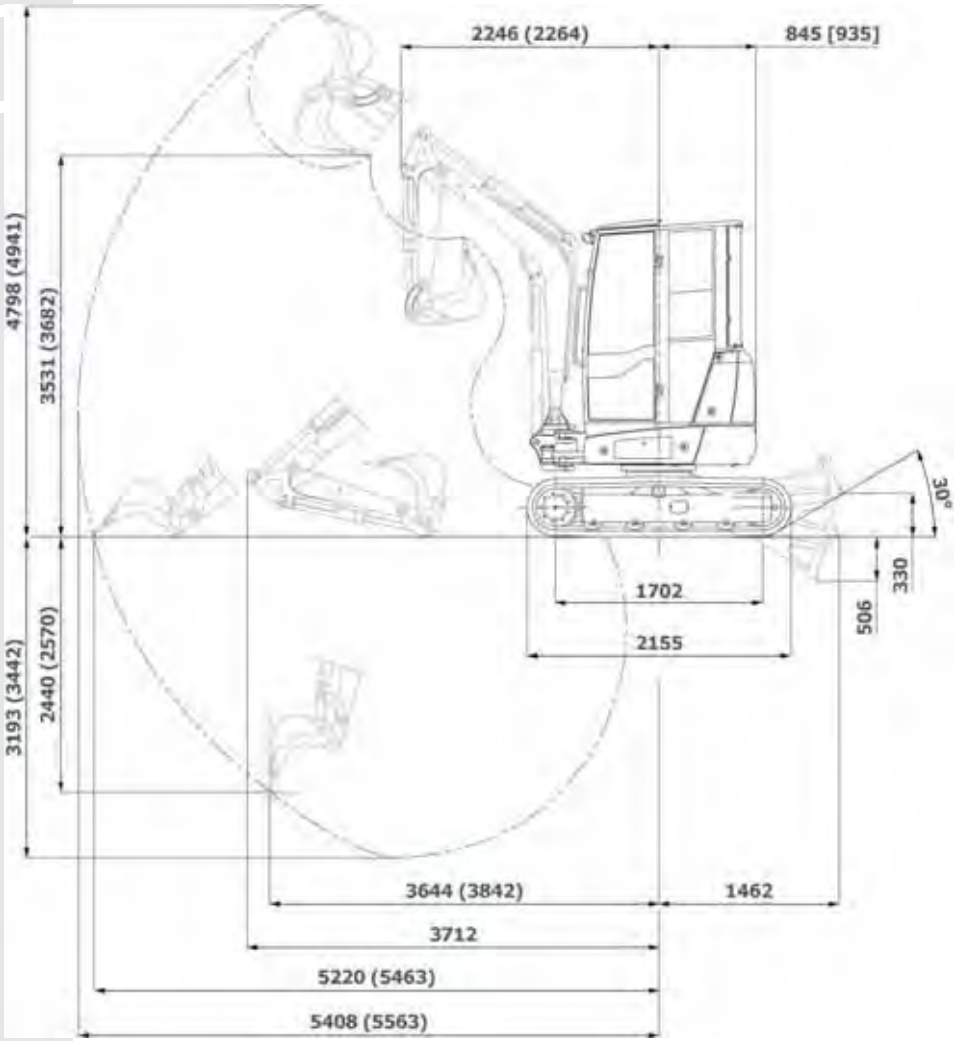
ES2-0110





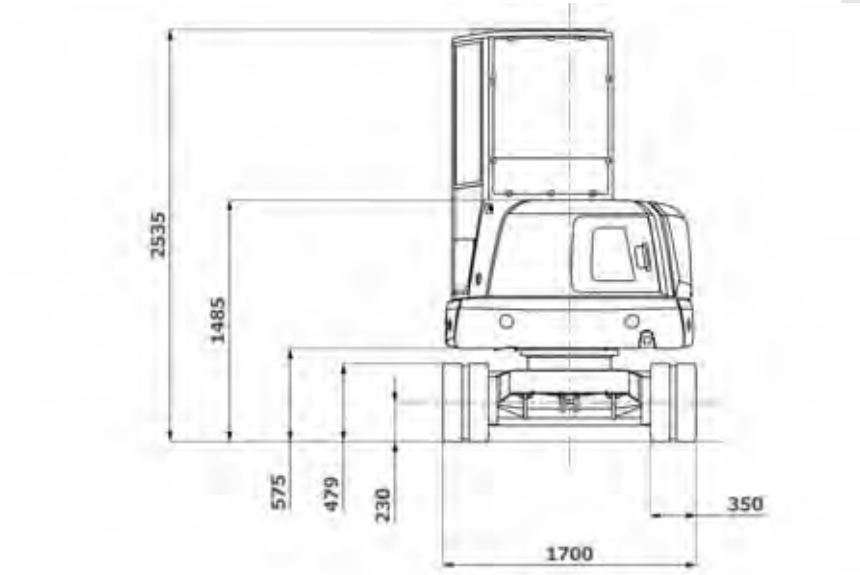
ES2-0120

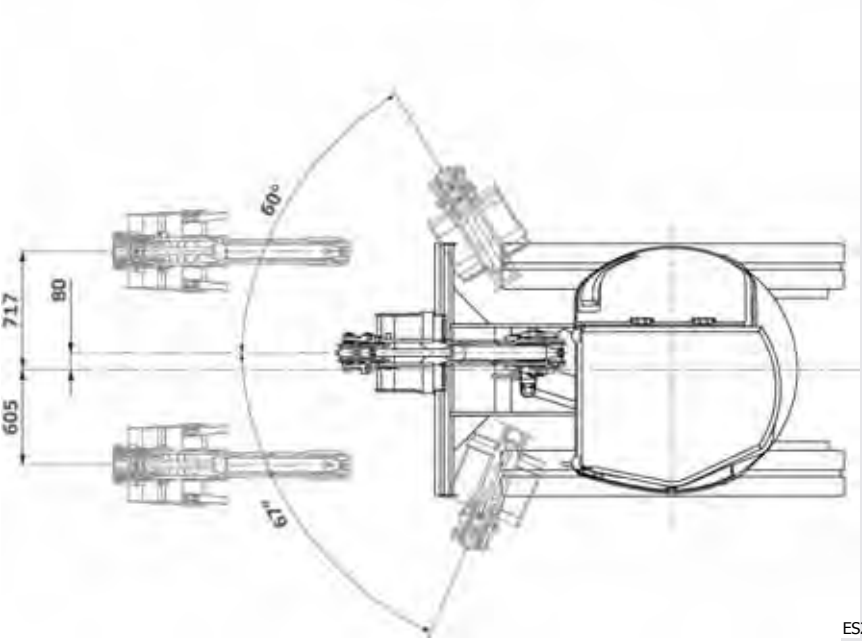
4.14.3 Model ES40ZT



Standard boom (long version)
Standard ballast [additional ballast]

ES2-0130





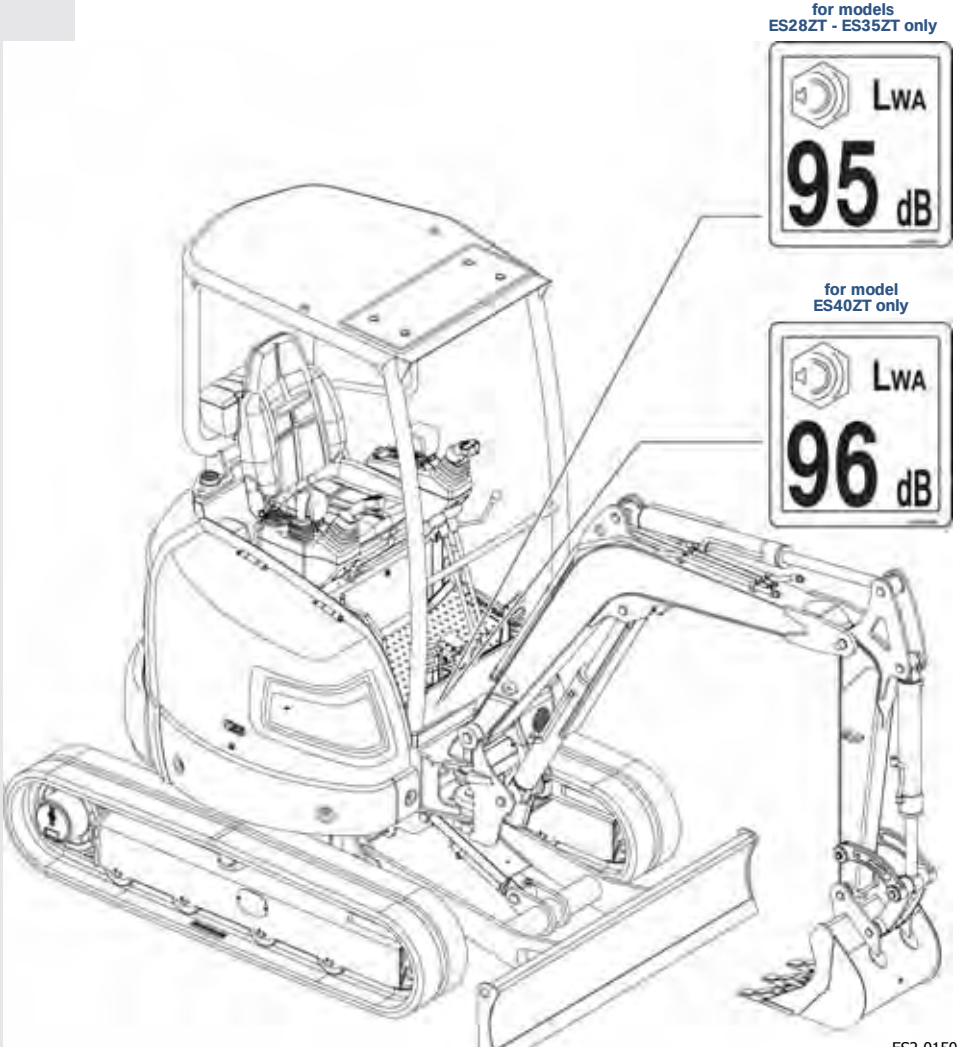
ES2-0140

4.15 Noise characteristics

The machine complies with specifications 2000/14/EC, 2005/88/EC and subsequent amendments relating to noise levels.

The noise characteristics indicate the guaranteed noise level in dB (A). It is indicated by a decal affixed to the right front side of the turret.

The acoustic noise pressure level (LpA), as recorded at the driving position in accordance with ISO 6396:1992, is equivalent to 79 dB (A) and, therefore, in accordance with the standards, no special hearing protection equipment is required.



4.16 Machine vibration characteristics

The level of vibration transmitted through to the operator depends mainly on the ground conditions in which the machine is operating, the work methods being applied and the accessories fitted to the machine.

Exposure to vibration can be reduced substantially by complying with the following suggestions:

- make use of accessories that are suitable for the type of machine and the type of task to be performed;
- adjust and lock the seat in the appropriate position; In addition, regularly inspect the seat suspension, making any necessary adjustments and performing any necessary maintenance;
- regularly perform any necessary maintenance in the area around the driving position;
- operate the accessories smoothly, as far as possible avoiding any sudden movements or excessive jolts;
- adjust your speed and route and, as far as possible, avoid particularly bad routes and hitting possible obstacles, so as to minimise the level of vibration.

The average quadratic frequency value on acceleration to which the operator's upper limbs is exposed, does not exceed 2.5m/s².

The average weighted quadratic frequency value on acceleration to which the operator's body (feet or seat) is exposed, does not exceed 0.5m/s².

IMPORTANT

This machine is equipped with a driver's seat that complies with the requirements of standard ISO 7096:2000.

This ensures that the level of exposure of the operator's body to vibration complies with the requirements, in terms of protection against vibration, when the machine is used as envisaged by the intended use, and in accordance with the provisions of this manual.

5.0 Transporting the machine

CAUTION

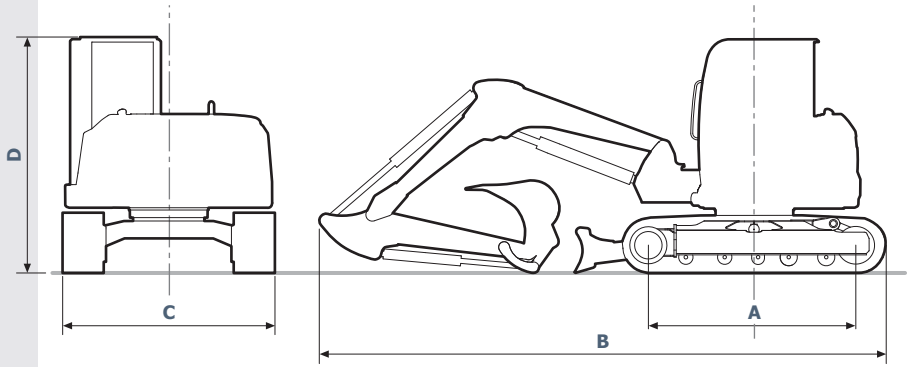
Ensure that the vehicle used to transport the machine has an adequate loading capacity.

Before loading the machine, check that there is no grease, oil, soil, ice or other slippery material on the loading platform and ramp.

Do not turn on the ramps. Align the machine tracks with the ramps before proceeding and move in a straight line. If the machine is off line when going up the ramps, stop the machine, reverse back down and try again.

Use the appropriate fixing points when anchoring the machine down on the vehicle.

5.1 Transportation dimensions

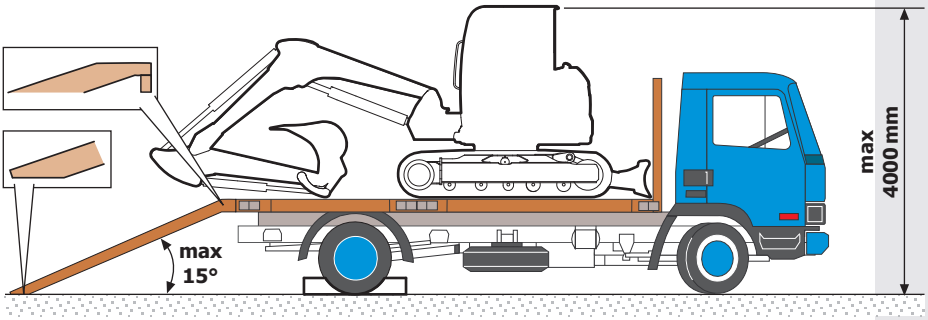


EG-0670

MODEL		ES28ZT	ES35ZT	ES40ZT
A	Chassis length mm	1648	1702	1702
B	machine-side length2913 mm	4323	4472	4789
C	Track width mm	1550	1580	1700
D	height – top of protective structure mm	2529	2529	2535

Before using ramps to load or unload this vehicle:

- the loading and unloading of the excavator must be carried out with the ramps resting on level ground;
- make certain that the ramp load rating is adequate for the gross vehicle weight of the excavator.
  If a pair of ramps is required, ensure that each ramp has an adequate load rating, and is at least 300 mm wide;
- The angle of the loading ramp(s) must NOT exceed 15°;



EG-0360

- install the two ramps so that the axis of the machine is aligned with that of the truck;
- the ramps must be rigidly connected to the truck deck in order to avoid possible disconnection while the machine is being loaded;
- make sure that the truck parking brake is engaged and then fit non-slip chocks in front of and behind the tyres.

IMPORTANT

During the winter, warm up the excavator's engine and hydraulic system before commencing with any loading/unloading operations.

5.2 Loading-unloading operations

When loading or unloading the machine onto or off a transport vehicle, a special platform must be used.

Ramps of adequate capacity may however be used. Load the vehicle as indicated below:

1 - align the vehicle in a straight line with the truck. Load the compact excavator onto the truck in reverse and unload by driving the compact excavator off forwards. Before driving on or off, check to ensure that the alignment is correct; if not, repeat the alignment operation.

⚠ CAUTION

To reduce the risk of personal injury caused by the machine tipping, DO NOT attempt to turn the vehicle or swing the turret or boom while the vehicle is in motion on a loading ramp or on a truck or trailer deck. The vehicle must be properly positioned before commencing with the loading.

2 - Begin to load the vehicle. Have an observer watch the loading or unloading operation from a safe distance, to warn the operator of any otherwise unseen situation that may develop;

3 - as the vehicle passes over the top of the ramps during loading, the vehicle will pivot on the centre of its tracks towards the level of the truck or trailer deck. Maintain slow, steady progress until the vehicle completes this pivot movement and both tracks are in full contact with the deck of the truck or trailer;

4 - position the vehicle on the trailer and lower the dozer blade onto the deck;

5 - close the bucket or the equipment, retract the dipper stick and lower the digging boom onto the deck;

6 - secure the vehicle to the deck of the truck or trailer.

To unload the vehicle, follow the above procedure in reverse order.

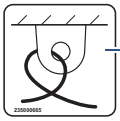
IMPORTANT

During unloading, the vehicle will pivot again as it crosses over the top of the ramps. Maintain slow, steady progress until the vehicle completes this pivot movement and both tracks are fully in contact the ramp(s).

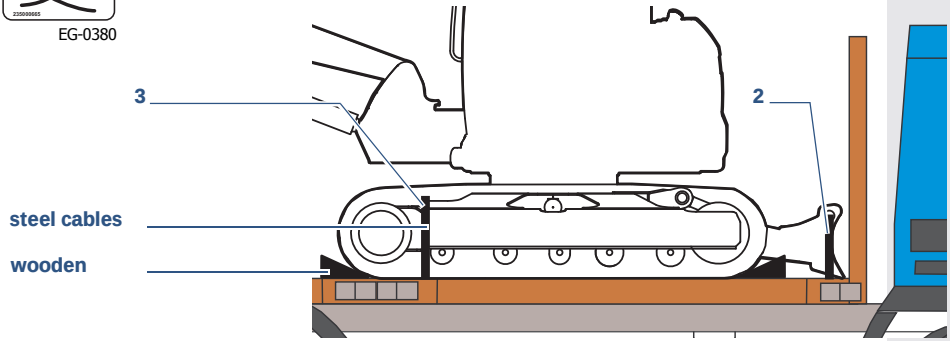
5.3 Securing the excavator on the truck

After loading the excavator properly onto the truck, tie it down securely as follows:

- Place wooden wedges at right angles behind and in front of the tracks;
- secure the machine using suitable chains or cables to prevent the vehicle from moving in transit. The fixing points are the holes shown on the decals (**1**), on the blade (**2**) and on the undercarriage frame (**3**);



EG-0380



EG-0370

- make the excavator safe by following the instructions provided in point 7.26.

5.4 Lifting the machine.

DANGER

When lifting the machine, comply with the regulations in force in the machine's country of use.

Before lifting the machine ensure that the crane to be used has a suitable load-bearing capacity to lift the weight of the machine.

Do not use worn or frayed cables.

Only hook the cables at the special anchoring points.

Never lift the machine with the operator on board.

Clear any persons in the vicinity of the machine.

The operator lifting the machine with a crane must be suitably qualified .

Always make sure that the metal cable used to lift the machine is of sufficient size for the weight to be lifted.

Never lift the machine with the turret turned to the side. Before lifting the machine, turn the working equipment so that it is on the blade side and place the undercarriage and the turret parallel with each other.

While lifting, keep the machine in the horizontal position.

Never pass under the machine while it is being lifted.

Never attempt to lift the machine in a position different from what is illustrated below, because the machine could lose its stability.

IMPORTANT

For details of the machine weight, see point 4.4

The lifting procedure described applies to machines with standard specifications.

The lifting method varies depending on the equipment and accessories fitted. In such cases, contact the EUROCOMACH service centre for more specific information.

Both canopy and cabin versions of the vehicle may be lifted.
The machine is equipped with shackle anchor points that enable stable and balanced hoisting, provided the instructions in this paragraph are strictly adhered to.

The machine must be lifted on a flat and compact surface and must be lifted by the following procedure:

1 - start the engine, turn the turret so that the working equipment is on the opposite side to the blade, with the undercarriage and the turret parallel with each other;

2 - move the boom to a swing angle of "0" (if present);

3 - raise the boom fully, close the bucket and retract the dipper stick;

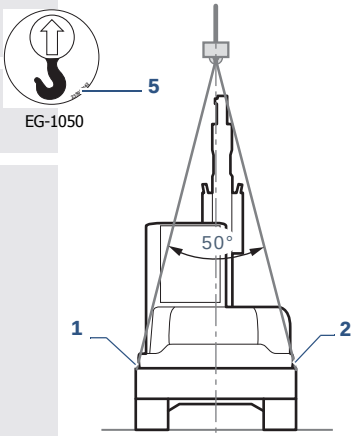
4 - raise the dozer blade completely;

5 - raise the servo-control cut-out lever;

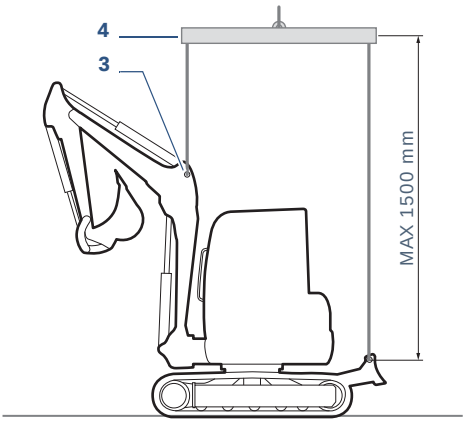
6 - stop the engine and make sure there are no obstacles around the operator area, close the windows and the windshield in the cab (if present), remove the ignition key and then get down from the machine. Close the cab door (if fitted);

7 - fix the lifting slings to the parts of the vehicle designed to take them (these points are indicated by the relative decals **5**):
- one each on the left (**1**) and right (**2**) side of the dozer blade, as well as
- one on the rear dipper stick cylinder-mounting frame (**3**);

8 - fix the harness to a suitable lifting bar (**4**), with maximum sling lengths of 2500 mm.



EG-1050



EG-1080

CAUTION

Do not use counterweight wires, either for the canopy or the cab, to lift the machine.

IMPORTANT

Do not attempt to lift the machine by attaching a metal cable to the bracket provided for fixing the machine while in transit, because this could damage the undercarriage frame.

9 - Adjust the length of the metal cables so that the angle between them is the same as shown in the figure, then lift the machine slowly;

10 - when the machine is off the ground, check the conditions of the hook and the lifting position which MUST BE HORIZONTAL, then lift slowly;

11 - lower the machine slowly onto a flat and compact surface until it rests fully on the ground.
Detach the cables.

DANGER

To minimize the possibility of accidents and serious bodily injury, all crane operation and rigging personnel must be properly qualified and experienced. It is their responsibility to ensure that the proper equipment is used to lift this vehicle. The lifting equipment must be correctly rated and properly connected to the designated lifting points on the vehicle.

DANGER

NEVER allow anyone to stand on or under the vehicle while it is being lifted. Failure of the lifting equipment may cause the excavator to fall, potentially leading to serious injury or death.

5.5 Use of the excavator for towing purposes

⚠ CAUTION

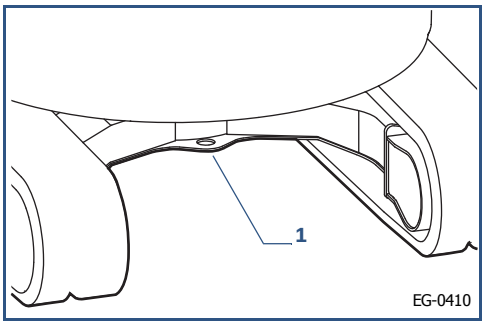
TOWING THE EXCAVATOR WITH ANOTHER MACHINE IS PROHIBITED.

This vehicle may only be used to tow other vehicles over short distances, since the excavator is not equipped to control the steering and braking functions of the towed vehicle and, therefore, towing must only be carried out when absolutely necessary and completely subject to the following conditions:

1 - the gross vehicle weight of the towed vehicle must not exceed the unladen weight of the excavator.

2 - **NEVER** use the speed control system while towing another vehicle; the broken down vehicle must be towed at a speed not exceeding 2 km/h.

3 - **NEVER** secure the towing cable or chain to any component of the upper part of the vehide structure, including the boom, the dipper stick, the bucket or any fitted accessory. The towing cable or chain may only be fixed to the rear tow hitch mounted on the chassis (**1**).



4 - **NEVER** continue towing unless both tracks are fully in contact with the ground.

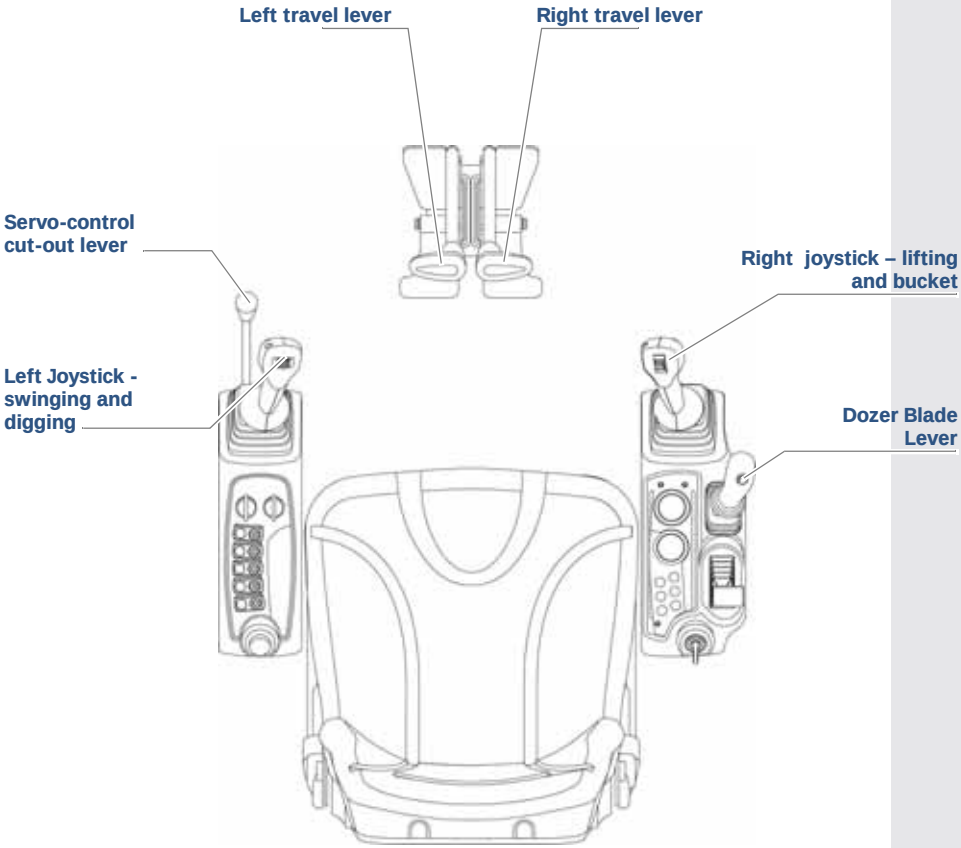
5 - Tow for short distances only. Stop towing immediately if the vehicle starts to overheat.

6 - When towing, keep the towing chain or cable taut at all times.

6.0 Controls and instrumentation

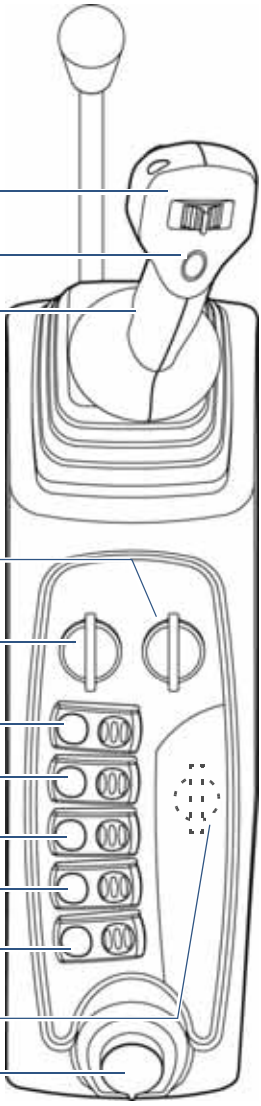
How each control and instrument works is described in point 7.0.

6.1 Description of control levers


Left travel lever
Right travel lever
Servo-control cut-out lever
Right joystick – lifting and bucket
Left Joystick - swinging and digging
Dozer Blade Lever

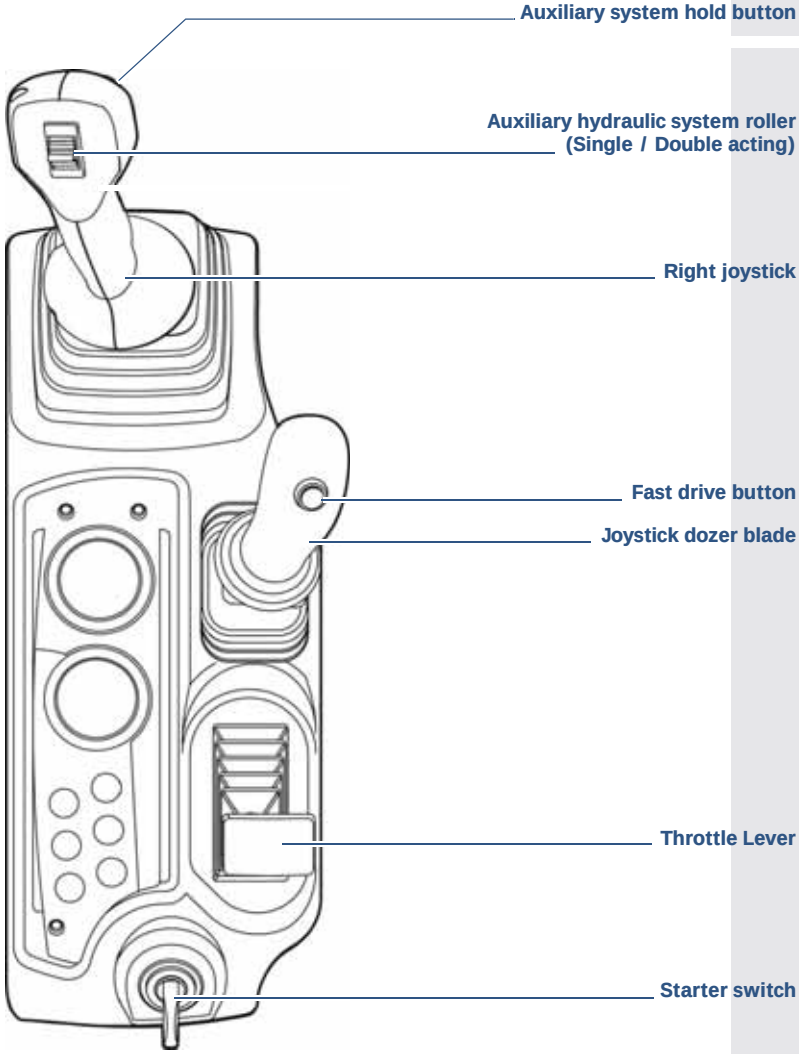
ES2-0160

6.2 Description - left control console



The power socket on the left control console can be used for the roof rotating light or for any other equipment that uses a "cigarette lighter" type socket.

6.3 Description - right control console

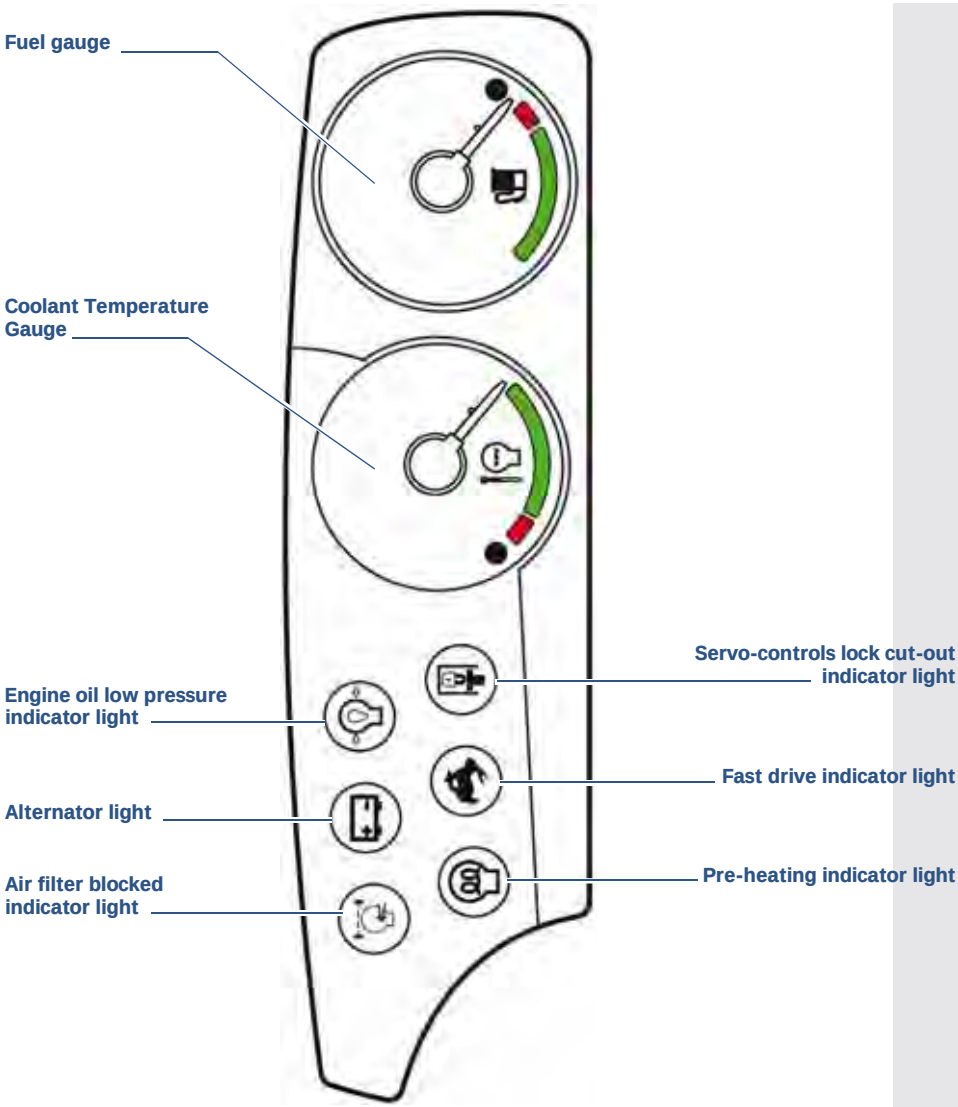


ES2-0180

IMPORTANT

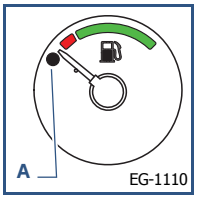
The rollers are proportional controls, not to be held with constant pressure which, depending on the installation, can turn to the right/left or up/down.
A greater movement of the roller gives a proportionally quicker response from the associated function.
Rollers are electro-proportional commands which control the hydraulic functions. These are very sensitive, so take care when working not to touch them by accident, an unwanted hydraulic function could occur compromising the safety of the operator and anyone nearby.

6.4 Dashboard



ES2-0190

1 - Fuel gauge



Indicates the fuel level in the tank: Refill the tank when the pointer is close to the red band.

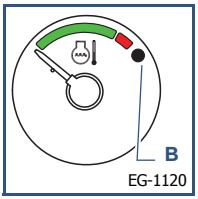
2 - Fuel level indicator light (A)

Lights up when the fuel level is very low.

Stop the machine as soon as possible and refuel.

When working on slopes, refuel the first time the light comes on; The engine could stop suddenly and make it difficult to control the machine which can be very dangerous for the operator.

3 - Coolant Temperature Gauge



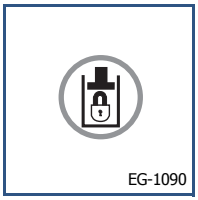
Indicates the engine coolant temperature.

After starting and warming up, the engine temperature gauge should be in the green zone. If, instead, it is in the red zone, open the cover to allow the engine to cool down. When the pointer goes down, shut down the engine, wait for it to cool, then check that the coolant level in the radiator reservoir is correct, check for leakages, check that the radiator core is clean and that the fan belt has not worked itself loose.

4 - Coolant Temperature Warning Light (B)

If the light comes on, it means that the coolant temperature is too high. Open the engine cover to allow the engine to cool down. When the pointer goes down, shut down the engine, wait for it to cool, then check that the coolant level in the radiator reservoir is correct, check for leakages, check that the radiator core is clean and that the fan belt has not worked itself loose.

5 - Servo-controls lock cut-out indicator light



Lights up when the servo-control cut-out lever is raised.

When this indicator light is on, no movements can be made with the machine.

6 - Fast drive indicator light

Lights up when fast drive is engaged.

EG-0450

7 - Pre-heating indicator light

When the starter switch key is turned to the RUN position, this indicator light comes on for six seconds.

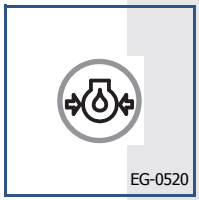
Instead, if the engine is already warm, it does not light up at all.

EG-1100

8 - Engine oil pressure indicator light

It comes on when the engine is not running the moment the key is inserted in the starter switch in the RUN position and goes out as soon as the engine lubrication circuit becomes pressurised.

If this light remains on or comes on while the engine is running, stop the machine immediately and look for the cause of the fault .

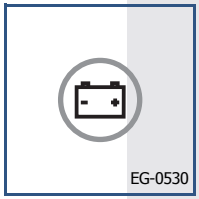

EG-0520

IMPORTANT

In cold conditions with the engine just started, the light may remain on for a little longer than usual.
If this happens for too long, stop the machine and look for the cause of the fault .

9 - Alternator light

Comes on when the starter circuit is powered up and goes out when the engine reaches idling speed; If this light stays on when the engine is at idling speed, it means that the alternator is not working and so the battery is not being charged properly.


EG-0530

IMPORTANT

If the light remains off when the starter switch ahs been turned to the RUN position, it means that the alternator is faulty or broken, so check the alternator and the tension on the belt.

10 - Air filter indicator light

Lights up when the air filter element is clogged; remove and clean the intake filter, replace it if necessary.

The procedure for this operation is described in point 9.11.18.

EG-0510

IMPORTANT

If the air filter is clogged, engine performance is reduced.

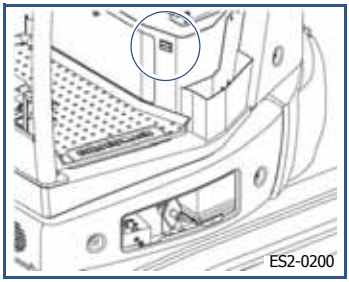
CAUTION

The signals, lights and buttons only operate once the key starter switch has been turned to the RUN position .
Check the fuel level prior to starting work.

6.5 Hour meter

Records the working hours carried out by the machine; it is located at the bottom left of the operator station.

The two red digits on the right show the hundredths of an hour



ES2-0200

IMPORTANT

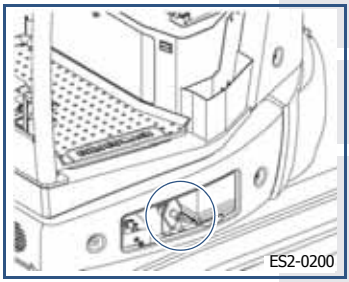
This meter keeps running whenever the engine is running.
Take a reading on a daily basis.

Use the hour meter to monitor the intervals for maintenance.

6.6 Battery disconnection switch

The battery disconnection switch is located in the left side inside the door (point 9.2.3). Power from the battery to the machine's elec trical system can be cut off by turning the switch counter-clockwise.

For how it works see point 7.2.



7.0 Using the machine

CAUTION

For the most part, increased safety is dependent on the operator's actions and attitude.
Incorrect use of the machine can be dangerous.
Before starting work, concentrate all your attention on what you are about to do, and take all the necessary precautions.
After ensuring that the machine is safe and in good working order, remember that everyone using the excavator must be suitably trained in its use, must be well informed about the hazards deriving from the use of the vehicle and must be aware of all the procedures to be followed in order to ensure its proper use.

7.1 Start-up

WARNING

Carefully read through the information below and always comply with the requirements. Should any malfunctions occur with the excavator's functions, contact the local Eurocomach Service Centre:

- Remove all dirt from the windshield, if there is any, in order to ensure good visibility.
- Remove all dirt from the work lights and check to ensure that they switch on properly.
- Check the levels of coolant, fuel and oil in the engine sump, check whether the air filter is blocked and check for any damage to the electrical system.
- Check that no mud or dirt has accumulated around any of the moving parts and ensure that the controls are functioning properly.
- Adjust the driver's seat to a comfor table position that facili tates machine operation, and check for any signs of damage or wear on the seat belt and its locking mechanism;
- Check that the warning lights are working proper ly and check the angle of the headlights and work lights.

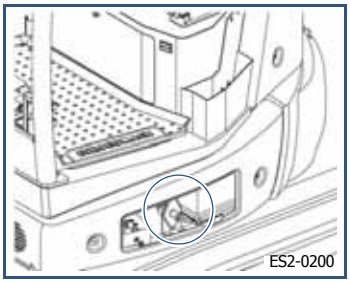
- Prior to starting up the engine, fasten the seat belt and lower the control cut-out lever.
- Check that there are no people or obstacles on, under or anywhere in the vicinity of the machine.
- Never check or fill up the fuel tank, batteries, hydraulic fluid tank etc. in the vicinity of any naked flames or sparks.
- Before moving the vehicle or operating the accessory, ensure that no persons are present in the surrounding working area.
- Acquaint yourself with the rules relating to the use of vehicles in the working area.
- The boom drive cylinders are fitted with end of stroke dampers. Therefore, it is normal for the extension or retraction movement to slow down, and this does not indicate poor performance or malfunction of the cylinders themselves.
- While working, always keep the dozer blade down in contact with the ground. This will provide the machine with optimum stability and ground adherence.
- Always maintain a safe distance from other machines and obstacles in order to ensure ideal conditions of visibility.
- When reversing, rotate the turret so as to always look in the direction of travel of the excavator.
  Watch out for other people; Should anyone enter the manoeuvring area, stop the excavator.
- Only use one of the types of bucket indicated in the relative table in the "Technical Specifications" section".
- Comply with the provisions of the excavator load capacity tables and ascertain whether there are any load restrictions imposed by the ground, paving or ramps on which you are to work.
- Observe the indicator lights. The red ones call for immediate action. See the instructions in the section "Controls and instrumentation".
- Do not leave the vehicle unless the dozer blade and the bucket have been fully lowered to the ground and the engine has been shut down.
- The operator is responsible for any outside persons operating the machine controls.
- Do not allow anyone to climb onto the machine while it is working.

- While using the machine, avoid any sudden swerves, abrupt acceleration or braking and making sharp turns. If you get confused, turn the engine off.
- Never leave the machine unsupervised with the engine running.
- After having shut down the engine, release the pressure in the hydraulic system by moving the control levers backwards and forwards repeatedly.

IMPORTANT

DO NOT use the vehicle at 100% of load capacity until the hydraulic fluid has reached normal operating temperature (about 50°C).

7.2 Battery disconnection switch



Before putting the machine into service check the status of the battery disconnection switch.

If the lever is in the "0" position the machine cannot be started, move the lever to position "1" to start the machine.

ALWAYS SWITCH OFF:

- before carrying out maintenance on the machine, so that it cannot be turned on accidentally by others;
- At the end of the working day before leaving the machine, to prevent any short circuits that could set fire to the machine.

When the switch is in the "0" position (Off) the lever can be removed by polling it towards you.

IMPORTANT

Always cut off the power by means of the switch before working on the battery or on the electrical system and before carrying out any welding on the machine.

7.3 Getting on and off the vehicle

When getting on and off the vehicle, the operator must be facing the machine and use the handholds provided on the cab frame.

Always enter and leave the vehicle from the left, after raising the servo-control cut-out lever, which is on the joystick panel.

IMPORTANT

Never use the control cut-out lever as a handhold when getting on and off the vehicle, as it could suffer serious damage.

7.4 Driving seat

The driving seat is of the approved type and complies with workplace safety legal requirements. It is fitted with a damping system and permits adjustment to the optimum setting for the operator's weight.

ES2-0210

DANGER

Do not adjust the seat lever while the machine is working.

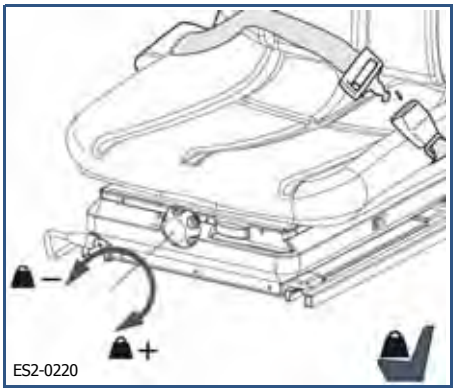
WARNING

To avoid injury, no objects may be left within the swinging radius of the operator's seat.

1 - OPERATOR WEIGHT ADJUSTMENT

This adjustment knob (**1**) is located at the top of the seat springs, towards the front of the machine.

Turn the lever to change the firmness of the suspension to obtain the ideal setting for the operator's weight.



ES2-0220

2 - FORWARD/BACKWARD ADJUSTMENT

A pair of guides allows the seat to be moved forwards or backwards.

The lever is positioned under the seat, towards the front of the vehicle:

- **-** the lever on the right next to the seat controls the movement of the seat only, and allows adjustment to obtain the most comfortable operator position in relation to the joysticks.

ES2-0230

WARNING

Seats that have not been adjusted correctly have a smaller range of movement. To prevent injury to persons, each time before the vehicle is started or whenever the driver is changed, the weight must be adjusted according to the weight of the driver.

3 - TILTING THE BACKREST

Make the adjustments with the operator in the seat and resting up against the backrest.

Pull the locking lever upwards to release the adjustment mechanism.

Keeping the lever in the released position, with your back counteract the rotary movement of the backrest (push towards the operator) until the best angle is found.

Still keeping your back against the backrest, release the locking lever and make sure the mechanism "clicks" to secure the backrest in place.

The backrest can be collapsed completely forwards until it is horizontal.

ES2-0240

IMPORTANT

If the operator is not sitting down, activate the locking lever keeping one hand on the top of the backrest to stop it from jumping forwards

WARNING

The seat position should always be adjusted to suit the operator's physique. A seat adjustment that is unsuited to the operator or to the type of work to be performed may lead to premature operator tiredness and result in the improper operation of the machine.
- The seat position should be individually adjusted for each machine operator.
- The operator must be in a position to press the pedals down fully and to operate the control levers properly, with his back resting comfortably against the backrest.
- If not, move the seat forwards or backwards and then try again.

CAUTION

To prevent accidents, before starting the vehicle check that all the adjustments have clicked into place properly.
The controls for adjusting the driver's seat must not be used while the machine is operating.

7.5 Seat belts

CAUTION

Serious bodily injury or death may result from any failure to use the seat belt fitted to this vehicle. The seat belt is a critical component of the operator protection system and is provided for the operators' safety in the event of the vehicle overturning. The seat belt MUST be used whenever this vehicle is being operated.

IMPORTANT

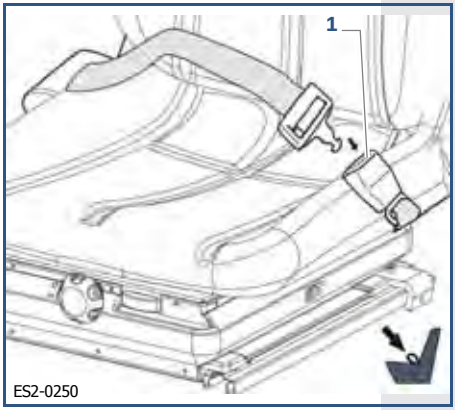
Inspect the seat belt on each occasion prior to use, in order to identify any cuts or worn webbing, or any defect in the latch assembly. If any wear or damage is noted, DO NOT operate the vehicle until the seat belt has been replaced.

Before starting the engine, first adjust the seat as required for optimum reach and comfort. Then adjust the seat belt as follows:

1 - Take the end of the seat belt (on the right side of the seat) and pull it across to the other side.

2 - With your back straight against the backrest and the belt buckle as low on your body as possible, clip the end of the belt into the part on the left side of the seat.

3 - To release the belt, press the red button (**1**) pulling the free end out of the buckle, accompany the belt as it rewinds and then get down from the machine.



CAUTION

Following an accident the safety belts must be replaced, the driver's seat and the seat fixings must be checked by technicians

7.6 Servo-control cut-out lever

The servo-control cut-out lever (safety lever) is located on the left joystick holder assembly.
Pulling lever (**1**) upwards raises the whole assembly, in position (**2**) all the controls are disabled.

When the lever **1** is pushed down again, the joystick unit returns to operating mode and the control circuit is restored.

This operation must be carried out whenever the driver leaves the vehicle and while the excavator is being transported.

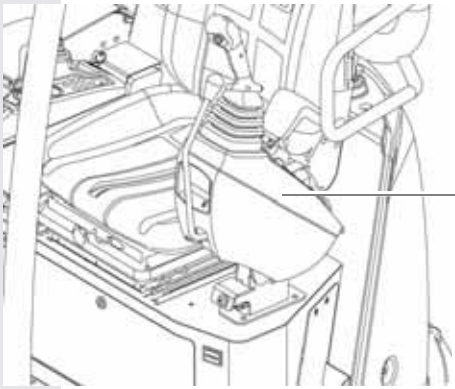
Once the control console has been raised, the "control locked" warning light on the dashboard illuminates (**3**).

In order to work, the excavator must have the lever (**1**) lowered, the decal (**4**) affixed to the side of the joystick holder shows how the lever works.

ES2-0270

EG-0550

4



ES2-0260

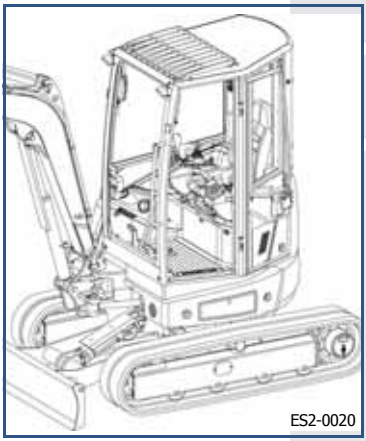
EG-1090

3

7.7 Protective cab (Optional)

The excavator can be equipped with a closed heated or ventilated cab.

The cab consists of a single unit, sec ured to the structure by flexible supports to dampen vibrations for increased operator comfort.



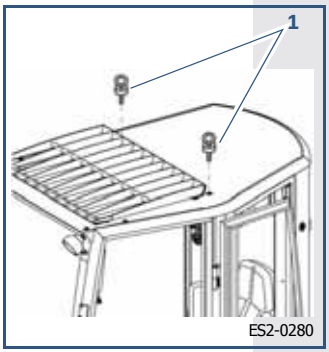
CAUTION

If the cab is bumped or the machine tips over for any reason, contact the local EUROCOMACH dealer immediately to check the cab's rigidity and the active protection that it must provide to the operator.

7.7.1 Cab assembly / dismantling

To assembl e the cab a cr ane and cables of adequa te diameter are needed, using the holes provided on the roof (**1**), to which the eyebolts must be attached.

Skilled staff must carry out this operation.

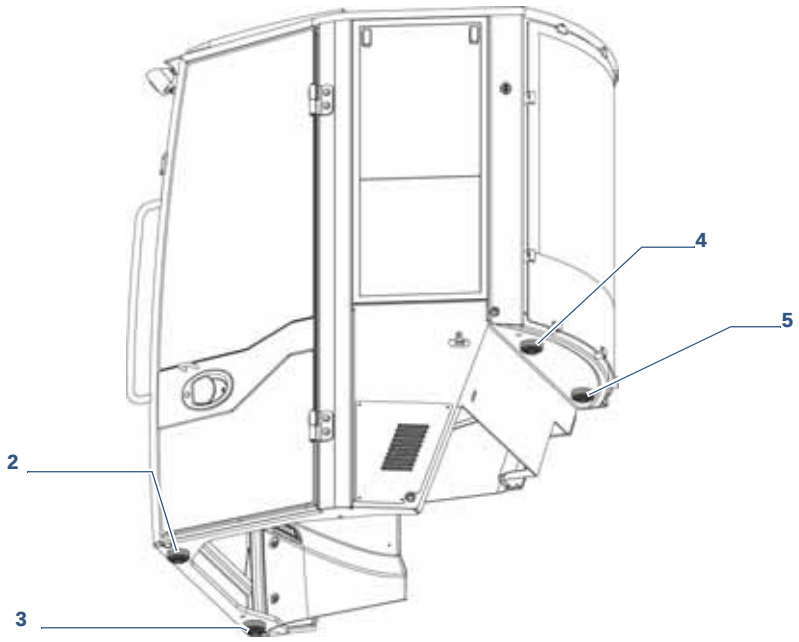


CAUTION

It is forbidden to lift the excavator by means of the eyebolts on the cab.

The cab is held in place by four holding screws.

Two screws (**2-3**) at the front, located under the rubber mat and two screws (**4-5**) at the back, located under the ABS covers.



ES2-0290

IMPORTANT

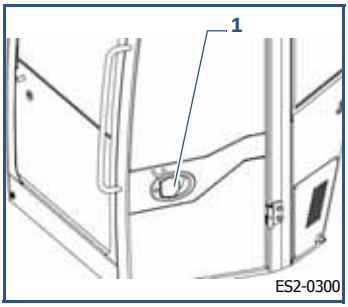
To dismantle the cab (for maintenance, cleaning, etc.) carry out the above procedure in reverse order.

7.7.2 Getting in and out of the cab

When getting in and out of the cab, raise the servo-control cut-out lever; this deactivates the servo-assisted controls.

ENTERING THE CAB

Access to the enclosed cab is by means of the left hand side door.



To enter the enclosed cab, unlock the door with the key provided, pull the handle (**1**) to release the latch, and pull to open. Once inside, grasp the interior handhold and pull to close and latch the door.

The door can be locked from the outside using the key provided.

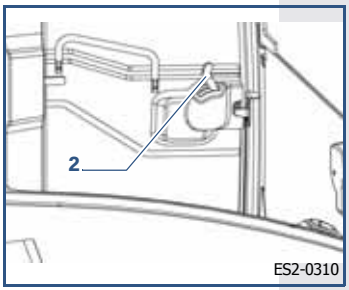
It is advisable to note the number of the key so that a spare can be ordered if necessary.

⚠ CAUTION

The driving cab door should be kept locked when operating the excavator, in order to prevent it from opening accidentally.

EXITING THE CAB

To exit the enclosed cab, grasp the latch release lever (**2**) and pull inwards, then push the door to open. After exiting, close and lock the door.



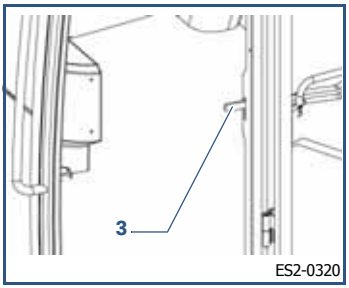
IMPORTANT

If an emergency occurs which prevents this door from being used, the front windshield of the cab can be used as an emergency exit

OPEN DOOR RESTRAINT RELEASE

The left cab door will be secured in the open position when it is opened and swung 180°.

To release the door and allow it to close, push down the lever that controls the lock, (**3**) located on the left upright.



IMPORTANT

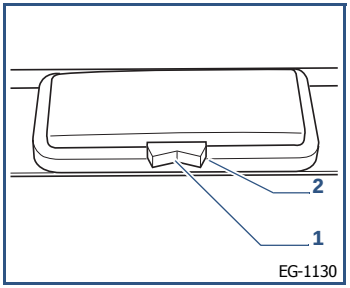
For easier connection, grease the connecting parts periodically

7.7.3 Dome light

The dome light is positioned on the left upright of the cab. To switch on the dome light, move the lever switch to the centre (**1**).

To replace the dome lamp bulb, insert a screwdriver between the lens and light housing (**2**) in order to release the retainer tabs on the lens, then remove.

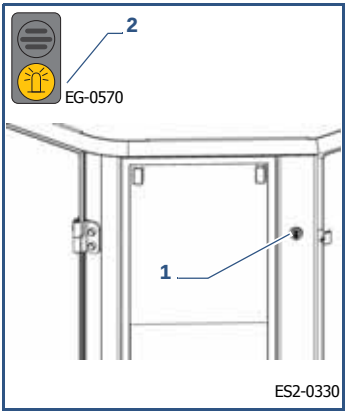
The power rating of the replacement lamp must not exceed 5W. Reinstall the lens by pushing it into the housing until the retainer tabs lock into place.



7.7.4 Auxiliary socket for roof rotating light

An auxiliary socket(**1**), used to power the roof rotating light is located on the rear left upright (outside the cab). The socket is a two- pin to ISO 4165 standard, powered by 12V.

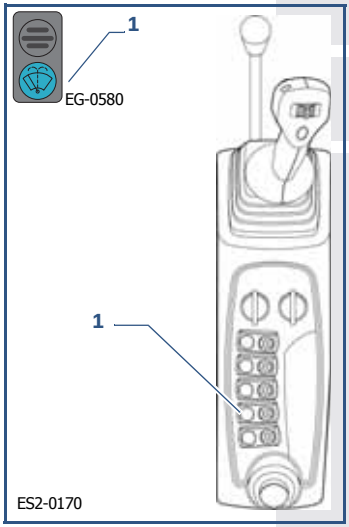
To activate the socket use the switch for the rotating light located of the left control console (**2**).



7.7.5 Windshield wiper

To activate the windshield wiper use the switch (**1**) located on the left control console, the first position turns the wiper on, the second position turns on the screen washer; when sufficient cleaning fluid has been dispensed, release the switch.

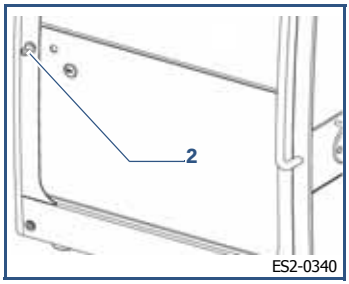
The starter key switch must be in the "RUN" position for the windshield wiper to operate.



Clean the wiper blades periodically with suitable detergents or alcohol. Make sure that they are not damaged or the cleaning will be streaky. replace the wiper blades if the rubber is permanently deformed or has worn areas.

In case of especially cold conditions (below 0°C) check that the wipers have not frozen to the windshield: if necessary, free them with a de-icing product.

If the windshield washer (**2**) fails to operate, check that the supply circuits are not blocked; if necessary clear the spray nozzles using a pin.



IMPORTANT

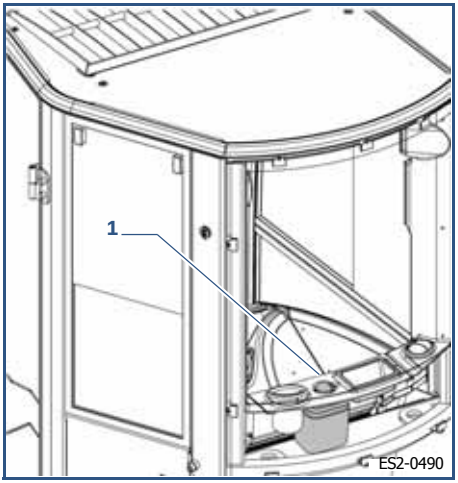
Failure to follow the above procedures will cause premature wear of the wiper blade rubber.

7.7.6 Water bottle for windshield wiper

The c ap of the windshield wa sher water bottle (**1**) is located in the cab at the driver's feet, allowing quick and easy ac cess for topping up the liquid.

Remove the cap and fill as required.

If ambient air temperatures are expected to drop below 0°C, use a special w asher fluid formulated for temperatures below zero.



7.7.7 Opening and tilting the windshield

The front windshield can be easily opened and left open for ventilation purposes.

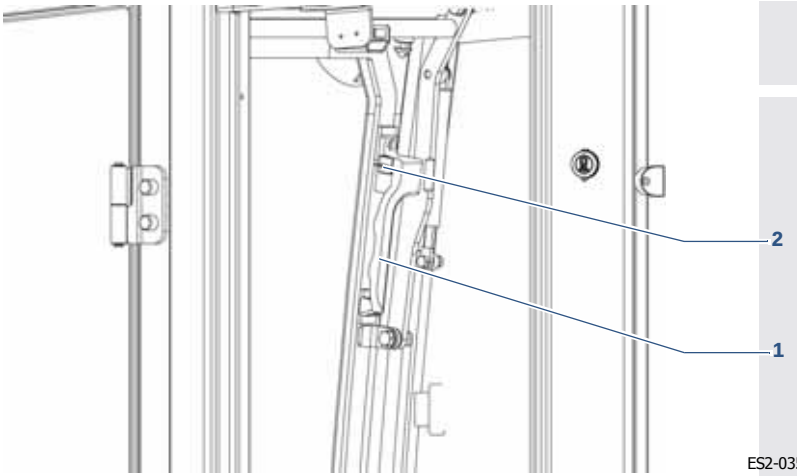
⚠ CAUTION

Always open or close the windshield with the machine switched off avoiding any accidental movements on the tracks and/or equipment .

1 - Take hold of both handles (**1**) one on each side and push downwards with the thumbs on the buttons (**2**) ;

2 - at the same time pull both handles backwards tilting the windshield inwards;

3 - with the aid of the gas strut, push the windshield upwards parallel with the cab roof in the fully open position until you hear both locks "click" into place.



- The windshield can be lowered by following the same procedure in reverse order until the locking "click" is heard. At this point the windshield will be completely closed.

CAUTION

When closing the windshield, take care not to injure your fingers or your head.

Never use the machine without the windshield properly locked in place at the front (windshield closed) or at the top (windshield open).

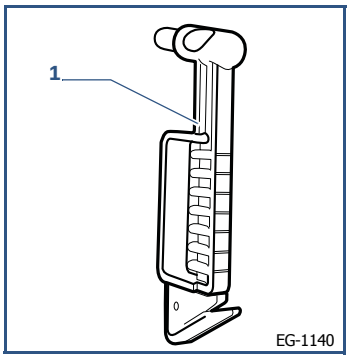
7.7.8 Hammer for emergency exit

⚠ WARNING

In the event that it is necessary to break the glass with the hammer, be careful not to injure yourself with the shards of glass.
Before leaving the cab, remove the fragments of glass left around the edge of the windshield to avoid injury.
Take care also not to slip on the glass spread out all over the ground.

On mac hines equipped with a cab there is an emergency exit identified and ma rked on t he front opening windshield.

In the eve nt of an emergency, if the windshiel d does not open by the normal means, break the glass withthe hammer (**1**).



IMPORTANT

Make sure the hammer is always left inside the cab and fixed to the right upright.

7.7.9 Opening the right side window

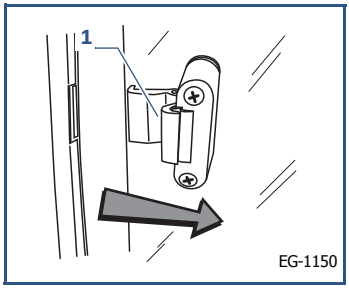
The right side of the cab has window that slides open.

Follow the procedure below to open and close it:

1 - take hold of the closing handle;

2 - move the window slowly (backwards to open the window, for wards to close it) to the requir ed position;

3 - let go of the handle.



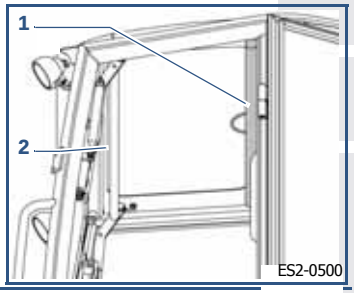
To lock the window closed, push the rear of the cbsing system forwards until a "click" is heard.

7.7.10 Sun shade

The large top window can be covered with a sun shade to protect from being dazzled by the sun.

Pull the end (**1**) to extend the shade and hook it onto the clip provided at the front (**2**).

To open the shade again, unhook it and accompany it as it rewinds.



IMPORTANT

Do not let go of the shade suddenly, rewinding too abruptly could damage it .

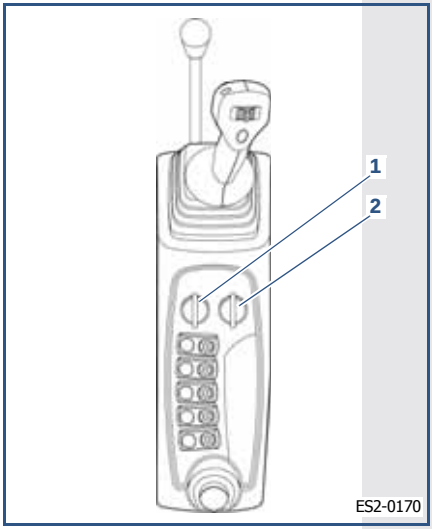
7.7.11 Ventilation and heating

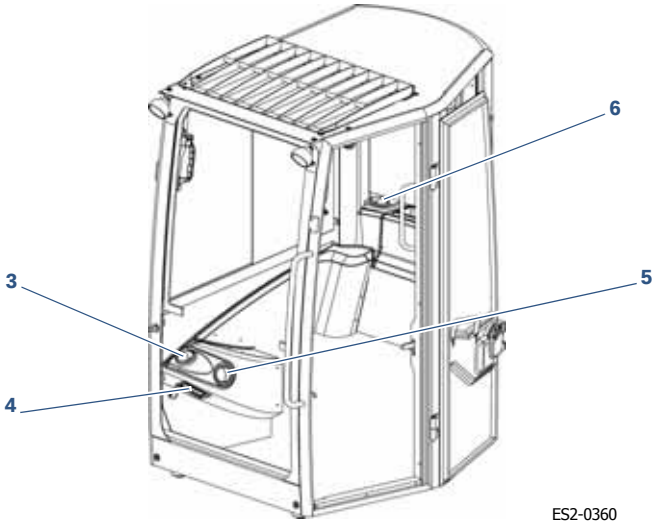
The unit is located under the operator's seat.

The ventilation and heating systems make driving the excavator a comfortable job in summer or winter. A three-speed fan installed inside the unit provides ventilation and fresh air.

The fan speed and the temperature of the cool air are controlled by two knobs on the left control console

- To adjust the fan speed:
  turn the knob (**1**) and set to the desired speed.
- To adjust the cool air temperature:
  turn the knob (**2**) to the left for cold air, towards the right for hot air).





The air vents can be adjusted and are arranged in such a way that to make the cab comfortable and well ventilated.

Two adjustable air vents (**3-4**) are provided to direct the airflow to the front windshield, as required, in order to keep the glass clear.

A third adjustable vent (**5**) is provided to direct air to the bottom section of the cab.

Behind the driving seat is another air vent (**6**).

7.8 Air conditioning (Optional)

DANGER

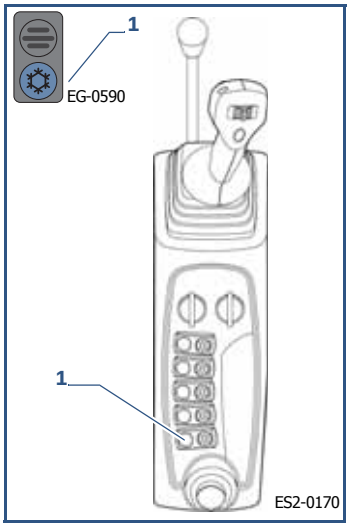
The coolant used in the air conditioning unit is very dangerous.
If it is accidentally sprayed into the eyes or makes contact with the skin, rinse immediately under running water and seek medical advice. In addition, to avoid possible explosions, do not generate sparks or use a naked flame in the vicinity of the unit.

The coolant used in the air-conditioning system is considered special waste and as such must be collected and disposed of in accordance with the applicable anti-pollution laws.

For specific maintenance operations to be carried out on the air-conditioning unit contact the EUROCOMACH service centre. Failure to comply with this instruction could lead to serious or even fatal injury.

The air conditioner is activated by pressing switch **1**, located on the left control console.

Once the conditioner is switched on (switch LED comes on), set the temperature and the fan speed.



IMPORTANT

The recommended temperature is 5 or 6°C lower than the outside temperature.

CAUTION

Even when the conditioner is not being used, run the compressor at low revs for approx. 3-5 minutes at least once a month. Doing this keeps all the moving parts of the compressor lubricated.

7.9 Starting the engine

Precautions for starting the engine

- Start the engine and operate the machine only from the driving seat.
- Never attempt to start the engine by short-circuiting the starter motor. This could cause a fire, as well as resulting in serious or fatal injury.
- When starting the engine, sound the horn to warn everyone.
- Do not allow anyone other than the operator to climb onto the machine.

7.10 Jump starting procedure

If the engine does not start when following the point 7.10.3 procedure, check that the battery is properly charged. Replace the battery if necessary.

If the battery charge is low, use the following procedure to start the engine.

⚠ CAUTION

If the vehicle has to be jump started directly on the starter motor or its solenoid, protect your face and hands with a mask and gloves. There is a risk of electric arcing because of the high starting current, with the risk of emission (ejection) of red-hot splinters from the contact point.

⚠ CAUTION

To avoid personal injury or death when jump-starting the vehicle, ensure that the two vehicles are not touching each other.
Keep sparks, flames, and all smoking materials away from the battery.
Lead acid batteries generate explosive gases when charging and when the engine is running. Wear safety glasses when you work near a battery.

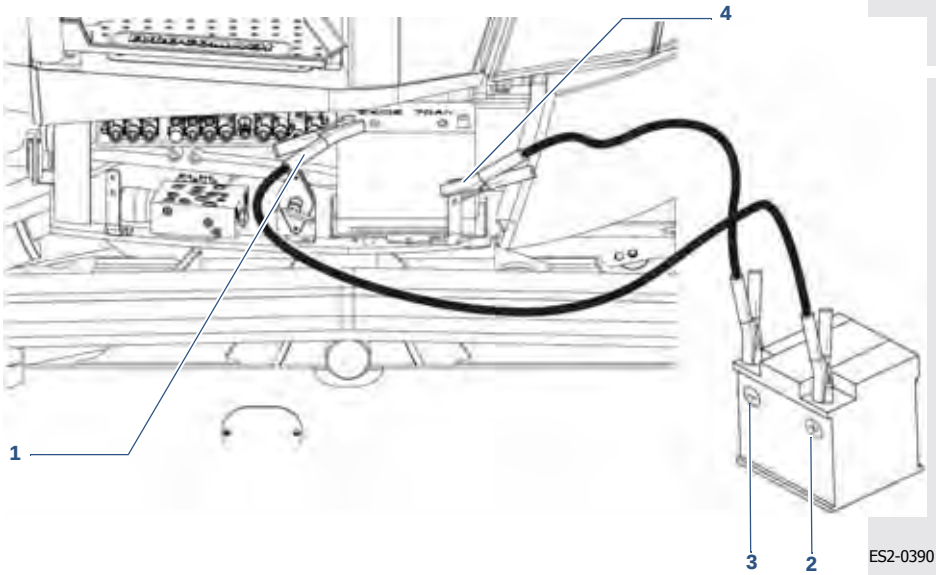
The vehicle used to jump-start must be equipped with a 12V negative earth system and a battery of at least 500 CCA (cold start amperes).

IMPORTANT

Before jump-starting, be sure the battery is not frozen. If the liquid inside the battery is frozen, remove the battery from the vehicle and wait until the liquid thaws before jump-starting or charging the battery.

To gain access to the battery and to carry out the jump start procedure, the engine cover must be opened by the procedure described in point 9.2.

The following procedure should be followed to jump start the engine:



1 - Connect one end of the positive (+) jumper cable to the positive (+) terminal of the flat battery (**1**) in the vehicle.

2 - Connect the other end of the positive (+) jumper cable to the positive (+) terminal of the booster battery (**2**).

3 - Connect one end of the negative (-) jumper cable to the negative (-) terminal of the booster battery (**3**).

4 - Connect the other end of the negative (-) jumper cable to an earthed point (**4**) on the vehicle.

5 - Start the engine.

6 - Once the engine is running, remove the jumper cables in the opposite sequence to the above, following steps 4, 3, 2, and 1.

7.10.1 Operation at low temperatures or during winter

PREPARATION BEFORE STARTING

The engine may be difficult to start in cold weather and the radiator water and battery fluid may freeze. Therefore, pay attention to the following elements.

1 - Engine oil

Use oil suitable for low temperatures:

SAE10W-30

2 - Fuel

Use diesel fuel with a pour point that is five degrees lower than the lowest outdoor temperature.

3 - Coolant

Add anti-freeze to the cooling water to prevent the cooling system from freezing. The following table shows freezing temperatures against the amount of anti-freeze added.

Before leaving the factory, the machine is filled with sufficient anti-freeze to cope with temperatures of –15 °C.

When upgrading the cooling liquid for operating at temperatures below -15°C, refer to this manual and to the one provided by the engine manufacturer.

IMPORTANT

Allow the engine and hydraulic fluid to warm up properly because, if they are not sufficiently warm before the control levers are activated, the machine will operate sluggishly, which may lead to accidents.

WARNING

Take care when using open flames as anti-freeze is flammable.

CAUTION

When the coolant level needs to be topped up, add the new coolant just before starting up the machine and not at the end of the shift, so as to prevent freezing.

4 - Battery

Battery capacity is reduced at low temperatures. If the charge voltage is inadequate, the battery fluid may freeze. If this happens, cover the battery or remove it from the machine, keep it in a warm place and fit it again the next time the machine is used.

⚠ CAUTION

If the battery is recharged using a booster cable, make sure that the earth cable is attached and the engine is switched off. Remove the filler cap and connect the cable to the battery.

⚠ WARNING

Since dilute sulphuric acid is used as electrolyte, take care not to let any of the liquid come into contact with hands or eyes.

7.10.2 Inspections prior to starting

Always carry out all the checks described in this section before switching on the engine.

Neglecting any of the inspections may result in problems being experienced with the machine, including the hydraulic equipment.

⚠ WARNING

In order to perform the inspections, always park the machine on a level surface.

Keep unauthorised persons away from the machine while inspecting it.

Ensure that the engine has been shut down prior to performing any inspection or maintenance operations.

Take a reading of the hour meter in order to ascertain whether it is time to perform any of the normal maintenance tasks indicated in the table on point 9.11.

1 - CHECKING THE AMOUNT OF OIL IN THE ENGINE SUMP.

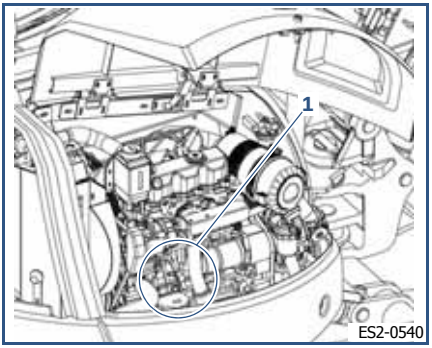
a - Pull out the dipstick (**1**);

b - clean it, wiping off the oil with a rag;

c - insert it again;

d - pull the dipstick out again and check how high the oil is up the stick.

If the level is low, add engine oil through the oil filler spout.



IMPORTANT

Use high-quality engine oil.
It is advisable to use the engine oil indicated in the applicable section.

CAUTION

Do not check the engine oil level immediately after stopping the engine, the engine oil is extremely hot and dangerous and it takes 30 minutes for all the oil to return to the oil sump. Inspect it either before commencing with work, or 30 minutes after the engine has been shut down.

Take care not to add too much engine oil.

Check the engine oil level 30 minutes after topping up.

IMPORTANT

Also check the oil on the dipstick to check for any deposits and the degree of viscosity.

WARNING

When topping up with oil, take care not to spill any. Clean up any spillage carefully. Any traces of oil may start a fire or pose a risk of personal injury and equipment damage.

2 - CHECK THE COOLANT LIQUID LEVEL.

WARNING

Do not remove the radiator cap unless absolutely necessary.
Before checking the coolant level, always wait for the engine to cool down and check the expansion tank.

Immediately after the engine has stopped the temperature of the coolant is very high and the radiator is under pressure; if the cap is removed to check the level of coolant under these conditions the operator runs the risk of being scalded. Wait until the temperature drops, then unscrew the cap slowly to discharge the residual pressure before removing it completely.

Do not use dirty coolant otherwise the fins could become blocked.

Open the engine compartment and check whether the level of coolant is between the MIN and MAX marks on the radiator overflow tank (**1**).

If the level is low:

a - unscrew the filler cap;

b - If the level is low, add coolant though the filler spout until the MAX level is reached;

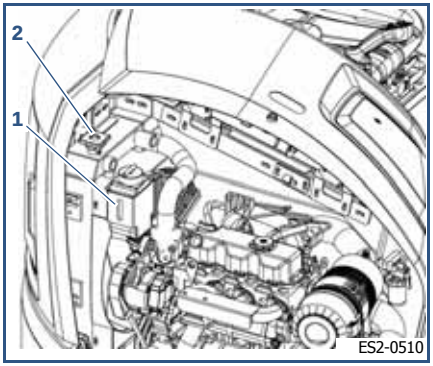
c - screw on the filler cap.

If the expansion tank is empty, there may be a leak. After checking, repair immediately if necessary.

If nothing unusual is found, check the level of liquid in the radiator by removing the cap (**2**). If the level is low, add liquid to the radiator and then to the expansion tank (**1**).

On completion of these operations, tighten all caps.

After one hour's work check again the level of the liquid in the reservoir (1).



3 - CHECKING THE OIL LEVEL IN THE HYDRAULIC FLUID TANK

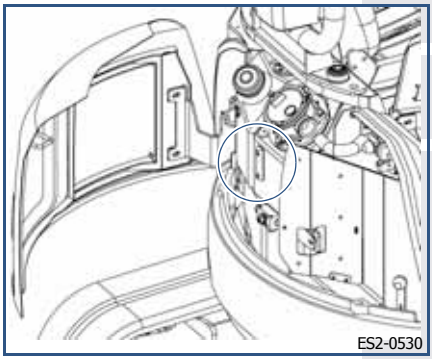
Make sure the hydraulic oil level is between the MIN and MAX level marks.

If the oil level is low add some more.

The tank is fitted with an internal low oil level sensor.

If the oil drops to a level insufficient to run the machine normally, an alarm message will appear on the display and the buzzer begins to sound.

For topping up operations, see point 9.11.7.


ES2-0530

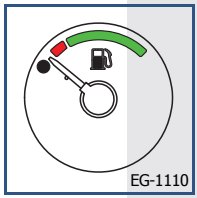
WARNING

It is dangerous to pour oil in the hydraulic fluid tank immediately after shutting down the engine.
The hydraulic fluid is very hot. or may be under pressure.
To prevent serious personal injury wait until the oil cools down.

4 - CHECKING THE FUEL LEVEL IN THE FUEL TANK

Check the fuel level reading on the fuel gauge located on the dashboard.

If the needle moves into the, red zone add more fuel.


EG-1110

⚠ WARNING

Do not expose the fuel to flames or sparks, as diesel fuel is an inflammable substance; this may cause a fire, with the risk of personal injury and machine damage.

IMPORTANT

The fuel gauge needle on the fuel tank does not move until the fuel level is almost full.
This is for confirmation purposes only.

⚠ WARNING

When topping up with fuel, take care not to spill any, clean up any spillage carefully.
As any traces of fuel may start a fire or pose a risk of personal injury and equipment damage.

5 - CHECKING THE FAN BELT

Pressing with the thumb midway between the alternator and crankshaft pulleys, check that the belt has 13 mm of slack, and also check for any signs of cracking; For the correct procedure follow the instructions given in point 9.11.16.

6 - CHECKING TRACKS FOR WEAR

Check to ensure that the tracks show no signs of cracks, breaks or excessive wear, and that the track tension is correct (see the section on maintenance for adjustment procedures).

7 - CHECKING THE CONDITION OF THE EQUIPMENT

Check the equipment fitted to the digging boom in order to ensure that it has been properly installed and fixed in place, as indicated in the respective manufacturer's manuals.

Check the amount of wear and inspect for any signs of oil leaks or accumulation of debris on the equipment, in which case immediate action must be taken to repair the leaks and remove the debris in order to avoid any machine breakdowns.

8 - CHECKING THE MACHINE FOR LEAKS

Check the whole machine for any liquid leaks, even if only slight.

These could lead to malfunctions and machine breakdown.

All the fitted parts must be inspected, including: pipes and hoses, hydraulic jacks, pumps and motors and the engine cooling system.

9 - CHECKING THE MACHINE FOR WEAR

Check the machine for any signs of worn or even missing parts.

If so, replace or refurbish them prior to starting up the machine.

10 - CHECKING THAT THE MACHINE IS CLEAN

Check the cleanliness of the machine so as to avoid any operating problems or even faults occurring while the machine is working.

Clean away from the machine all material that has built up during use (e.g. dirt, dust, stones, grass, etc.) especially in the areas of movement and articulation .

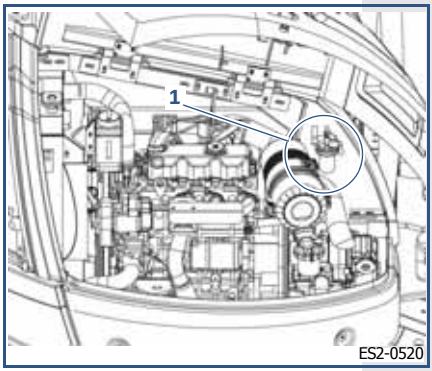
Check the outside as well as the inside the machine to avoid any problems of manoeuvrability during operation.

11 - CHECKING THE WATER SEPARATOR

Any water left in the supply circuit is collected in the water separator (**1**).

When the water in the separator reaches a critical level an alarm will appear on the display and the buzzer will come one to signal the need for maintenance.

When this alarm occurs, stop the machine and drain out the water following the procedure described in point 9.11.20.



IMPORTANT

After cleaning or fitting new parts, any air left in the circuit must be purged, for the procedures involved refer to point 9.11.22.

12 - CHECKING THE HORN IS WORKING

Make sure the horn is working properly, see "point 7.23" for the procedure .

If the horn does not work, repair it.

7.10.3 Engine starting procedure

Before starting the engine for the first time, familiarise yourself with the following procedure in **12** steps to be carried out at each start up.

Each control, gauge and indicator light involved in starting the engine and monitoring its status once it is running are listed in the order that they will be encountered.

WARNING

Prior to starting up the engine, read carefully the safety procedures described in the manual and check that you are familiar with the controls.

As soon as the engine is started, the operator is directly responsible for any damage that may be caused due to incorrect manoeuvring and failure to comply with safety and driving laws.

Never attempt to start the engine by short-circuiting the terminals of the starter motor. This could cause serious injury or fire.

Only start the engine when you are in the driving seat and with the safety belt fastened.

Before starting the engine, check that there is no one within the working range of the machine and then signal start up by sounding the horn.

The exhaust gasses are toxic. When starting the engine in a closed environment, make sure there is sufficient ventilation.

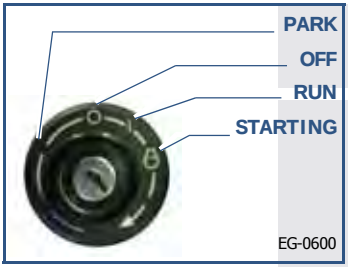
IMPORTANT

Do not attempt to start the engine with the accelerator at maximum, because the engine parts could become damaged.

1 - Starter switch

The starter switch and other locks used on this vehicle use the same key.

The starter switch has four positions -
"**PARK**",
"**OFF**",
"**RUN**" E
"**START**".



- "PARK position":

In this position power is supplied only to the stereo, the courtesy lights in the cab and to the fuel pump; in this position the key can be inserted or removed.

- "OFF" position:

This position has the same effect as the "PARK" position.

With the engine running and the key in the RUN position, when the key is turned to OFF, the engine switches off.

- "RUN" position:

When the key is inserted and turned to this position, the following electrical circuits are supplied with power:

- dashboard lights and gauges,
- joystick servo relays,
- glow plugs,
- horn,
- work lights,
- enclosed cab and cab equipment (if present).

- "START" position:

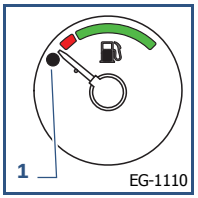
When the key is turned to this spring-loaded position, the engine starter motor will engage. When the engine starts, release the key and it will return to the "**RUN**

IMPORTANT

The engine is fitted with an automatic device that disengages the starter after 8-10 seconds of activity to prevent overheating of the starter motor. Turn the key to the OFF position, wait 10-15 seconds and then repeat the start operation.

2 - Fuel gauge

The fuel gauge indicates the approximate level of fuel remaining in the tank.



Prior to engine start-up, briefly turn the ignition key to the "**RUN**" also

IMPORTANT

The vehicle should be refuelled at the end of each workday in order to reduce the condensation of moisture inside the fuel tank, which is harmful to the fuel injection system.

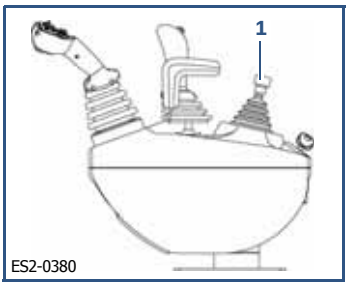
This warning light (**1**) will switch on to alert the operator that the fuel tank requires refilling.

If this warning light turns ON during operation, refill the fuel tank immediately. After topping up, with the engine running, the indicator light goes out.

3 - Throttle Lever

The lever (**1**) governs the engine speed mechanically and is on the right control console:

- moving the lever forwards reduces engine speed to low idle;
- for engine starting and initial warm-up, move the throttle knob to its mid-range position;
- move the lever backwards for maximum engine speed;



IMPORTANT

A complete description of how the accelerator knob works is given in point 7.18.

4 - Pre-heater

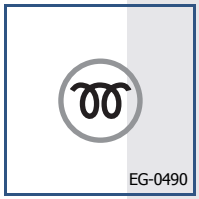
WARNING

The excavator's engine may only be run on the type of fuel indicated in the "Technical Specifications" section.

The glow plugs are electronically controlled, and are supplied with power whenever the ignition key is turned to the "**RUN**"also

An indicator light on the dashboard will come on whenever power is supplied to the glow plug circuit.

After a period of 5 to 10 seconds, the glow plugs will be heated and power to the circuit will be cut automatically.


EG-0490

Before starting the engine:

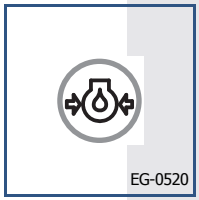
- if the ambient air temperature is 10°C or lower, it is necessary to wait for the glow plug indicator lamp to go out before engaging the starter to start the engine;
- if the temperature is above 10°C, or the engine is warm following recent use, the starter can be engaged immediately.

After a cold engine start, run the engine with the accelerator knob in the mid-range position to allow the engine and hydraulic system to warm up (without load) to normal operating temperature. As the various systems warm up, check all dashboard lights and gauges for any indication of a condition requiring any maintenance or service tasks to be performed.

5 - Engine Oil Pressure Warning Light

When starting up the engine, this warning light will come on when the ignition key switch is turned to the "**RUN**"also

The light will go OFF within seconds after engine start-up.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IMPORTANT

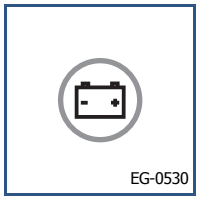
if the warning light DOES NOT light up when the ignition key switch is set to the "RUN" position, DO NOT continue attempting to start the engine. If the indicator light DOES NOT go off after start-up, immediately shut down the engine. The cause of the warning light malfunction must be identified and eliminated before using the vehicle again.

If the warning light comes on during normal machine operation, the engine automatically cuts its speed down to 1400 rpm to prevent any irreversible damage. Position the machine in a safe place and stop the engine. Contact the EUROCOMACH service centre in order to carry out inspection of the vehicle and eliminate all possible faults.

6 - Alternator Charging Light

When starting the engine, this warning light will come on when the ignition key switch is turned to the "**RUN**Falso

The light will go OFF within a few seconds after engine start-up.



EG-0530

IMPORTANT

in the case where the indicator light DOES NOT light up when the ignition key switch is set to the "RUN/PREHEAT" position, DO NOT continue attempting to start the engine. If the indicator light DOES NOT go off after start-up, immediately shut down the engine. The cause of the indicator light malfunction must be identified and eliminated before the vehicle can be used once again.

7 - Air filter warning light

This warning light comes on to indicate that the air filter is clogged and requires maintenance.

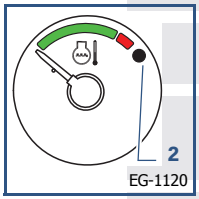
Refer to the "Maintenance" section of this manual for the proper service procedure.

EG-0510

IMPORTANT

If the warning light comes on during normal machine operation, the engine automatically cuts its speed down to 1400 rpm to prevent any irreversible damage. Position the machine in a safe place and stop the engine.

8 - Coolant Temperature Gauge



This gauge indicates the temperature of the engine coolant. Normal engine operating temperature is between 80°C and 95°C.

The needle must always be within the green area

If the needle reaches the red area, the warning light (**2**) comes on, in this case the working temperature exceeds 115°C.

IMPORTANT

If the warning light comes on during normal machine operation, the engine automatically cuts its speed down to 1400 rpm to prevent any irreversible damage. Position the machine in a safe place and stop the engine. Contact the EUROCOMACH service centre in order to carry out inspection of the vehicle and eliminate all possible faults.
Identify and remedy the cause of the overheating before continuing to use the machine.

On early morning start-up with a cold engine, do not accelerate sharply or rev the engine to the maximum. Before accelerating to the maximum wait until the coolant temperature is around 1/3 of the permitted scale value (green part).

7.11 Inspections before starting work

- In order to carry out the inspections, move the machine to a large area that is free of any obstacles and operate slowly. Do not allow anyone to stand in the vicinity of the machine;
- always fasten the seat belt;
- check the functioning of the drive system , steering and brakes, as well as the working equipment control system;
- check for any faults, such as noises coming from the machine, vibrations, heat, odours and instruments. Also check to ensure that there are no oil or fuel leaks;
- if any faults are encountered, arrange for immediate repairs;
- before driving the vehicle or commencing with any operations, check to ensure that the control cut-out lever has been lowered correctly.

DANGER

The control devices must only be activated from the driving seat with the safety bars lowered.
ALWAYS FASTEN THE SEAT BELT AND LOWER THE SAFETY BARS BEFORE MAKING ANY MOVEMENTS WITH THE MACHINE.

Precautions when moving forwards or in reverse

- Before commencing any movement, check that there are no people or obstacles in the surrounding area.
- Before commencing any movement , sound the horn to warn everyone in the immediate vicinity.
- Only ever operate the machine from the driving seat.
- Do not allow anyone other than the operator to climb onto the machine.
- Always lock the door and the windows of the cab in either the open or the closed position (if fitted).
- In areas where there is a danger that any items projected upwards may invade the cab, check that the door and windows are locked in the closed position (if fitted).
- If there are any blind spots behind the vehicle, place a person there to signal the operator. Take particular care not to bump into other vehicles or people when turning or rotating the vehicle.
- Before reversing backwards (using the tracks), turn the turret in order to see whether there are any obstructions or people nearby.
- Always be sure to take the above precautions, even when the machine is fitted with rear view mirrors.

7.11.1 During operation

DANGER

The control devices must only be operated from the driving position.
ALWAYS FASTEN THE SEAT BELT.

- Check for the proper operation of all controls (travel levers and control levers) for the machine and any accessories fitted.
- Never use the bucket to lift persons or as a work platform.
- Never transport other persons.
- Avoid making sudden, sharp movements.
- When working on uneven ground, always proceed slowly and operate with the bucket as low as possible.
- Carefully check the conditions of the area in which you will be working, in order to ascertain whether there are any anomalies in the terrain that could make the work hazardous.
- If possible, level the ground where the machine will be used, prior to starting work.
- Note the position of any overhead or buried pipes or electrical cables, as well as any open or filled trenches.
- When traversing, move carefully near the edge of excavations or trenches, and exercise extreme caution in cramped working spaces, or when working on uneven or steeply sloping ground.
- If you have to work indoors or in cramped spaces, ensure that the area is well ventilated.
- The exhaust gases of the engine can be fatal.
- Never try to start or use the machine unless you are sitting in the driver's seat.
- Only use the controls when you are sure of the movement the machine will make and do not take any chances if you're unsure, especially in obligatory work conditions or in the presence of dangers for your safety or the safety of others.
- Do not rest your feet on the control pedals (LH and RH travel control pedals) when not in use, but rather rest your feet on the floor, or alternatively on the supports provided at the side of the travel levers.
- Always fasten your seat belt before starting the machine. Familiarise yourself with location and function of all pedals, control levers, instruments and luminous indicator lights.
- Drive slowly and keep the bucket as low as possible when moving over uneven ground.

- Exercise extreme caution when negotiating any depressions, kerbs or railway lines.
- Do not use the bucket as a ram.
- When working on slopes, always keep the bucket lowered.
- Never stand under a raised bucket.

7.12 Stopping the engine

To stop the engine, proceed as follows:

- Park the vehicle on a level surface.
- Lower the dozer blade and boom assembly, as well as any accessories that may be fitted to it, down to the ground.
- In the event that the machine needs to be stopped on an incline; block the tracks by placing wedges perpendicular to the direction of slope, dig the teeth of the bucket and the dozer blade into the ground.
- Turn the accelerator knob to reduce the engine rpm to the minimum.
- Allow the engine to idle for 4-5 minutes in order to permit the temperature to stabilise.
- Turn the ignition key switch to the "OFF" position and remove the key.
- Raise the servo-control cut-out lever, unfasten the seatbelt and exit the vehicle using the handholds provided.

If you need to park on a public road, signal the obstade in accordance with the provisions of the local Highway Code (lighting signal fires, road works signs, etc.).

DANGER

Do not get off the machine with the booms and the bucket raised.
NEVER leave the machine unsupervised with the ENGINE RUNNING.
NEVER leave the lifting booms IN THE RAISED POSITION.

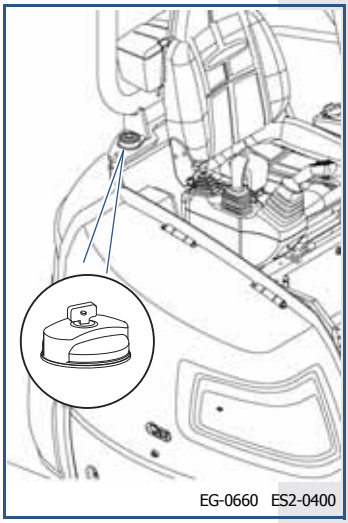
7.13 Refuelling

Fill the fuel tank at the end of each working day.

This will assist in preventing the formation of condensation in the tank.

To prevent dirt, water and other contaminants from entering the fuel system, proceed as follows:

- clean the area around the filler spout before unscrewing and removing the tank filler cap
- add diesel fuel from clean containers through a filtering funnel.
- the use of diesel fuel additives is not recommended. Follow the instructions on the product label when using any fuel additive.



EG-0660 ES2-0400

7.13.1 Refuelling with the electric pump

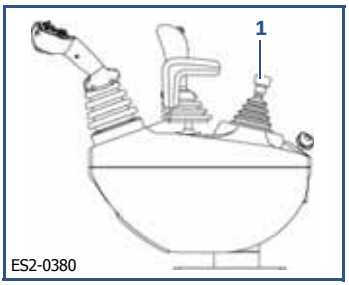
To refuel using the electric pump the machine is provided with, follow the instructions in point 7.11.

7.14 Throttle Lever

This command (**1**) is used to mechanically control the engine speed and power.t

1 - Minimum position: push the lever forwards.

2 - Maximum position: push the lever backwards.



7.15 Machine movement

⚠ CAUTION

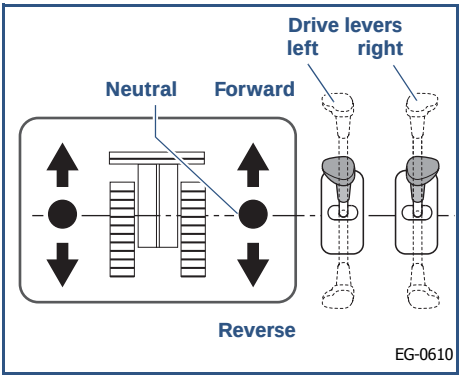
The levers control the vehicle's FORWARD and REVERSE motion, as well as LEFT and RIGHT steering and braking. The lever on the left controls the left track drive and the lever on the controls the right track drive.

The functions of both contro ls are locked out when the servo-control cut-out lever is raised to allow entry or exit from the vehicl e. To enable the controls, the servo-control cut-out lever must be fully lowered, see the procedure in point 7.6.

IMPORTANT

For safe movement of the excavator, always move the travel control lever slowly and smoothly. Operators unfamiliar with tracked vehicles should ini tially operate the vehicle at 50% of its maximum travel speed until they master the control function and feel confident on the vehicle.

- With both lever s in the NEUT RAL position, both tracks are motionless and hydraulic bra king is engaged on the travel motors.
- Whenever either lever is moved from its NEUTRAL (N) position, the brake for the respective track drive is r eleased and movement commences.
- Whenever either lever is returned to its NEUTRAL position, mo vement o f the respective t rack drive cea ses and braking is reapplied.



CAUTION

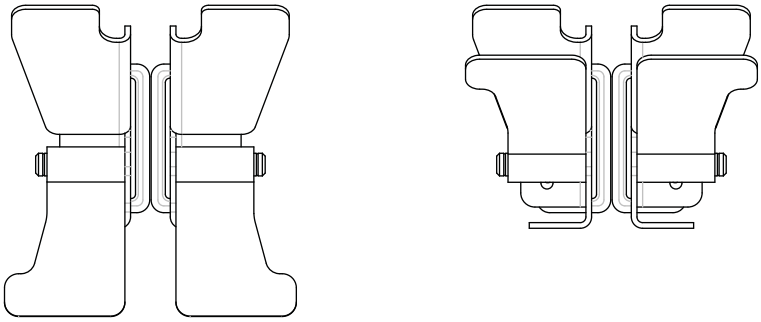
Unless specifically noted, all references to direction in this manual, including travel and turn instructions, are deemed to be from the operator's point of view and with the blade at the front.

The travel control levers operate the track drive motors mounted on the undercarriage.
The vehicle movements depend on the driver's orientation; If the operator is turned 180° in relation to the dozer blade, then the vehicle movements are the reverse of those indicated in the operating instructions.

IMPORTANT

Both the hand travel control levers have projecting pedals near the bottom of each lever.
These pedals allow the driver to operate the tracks without taking his hands off the joysticks; It is not advisable to use the pedals to control vehicle travel during loading and unloading operations using ramps, or in any dan gerous situations where the sensitivity of the hands is required to control the vehicle.

The pedals have rear parts that can be folded for wards to reduce their size. This gives more room for climbing into and out of the cab and for placing the feet while working.



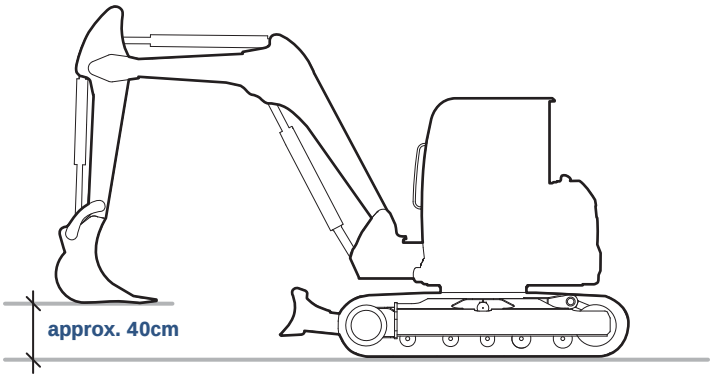
EG-1170

When moving the machine, keep it as follows:

1 - fold the booms. Raise the accessory to approx. 40 cm off the ground;

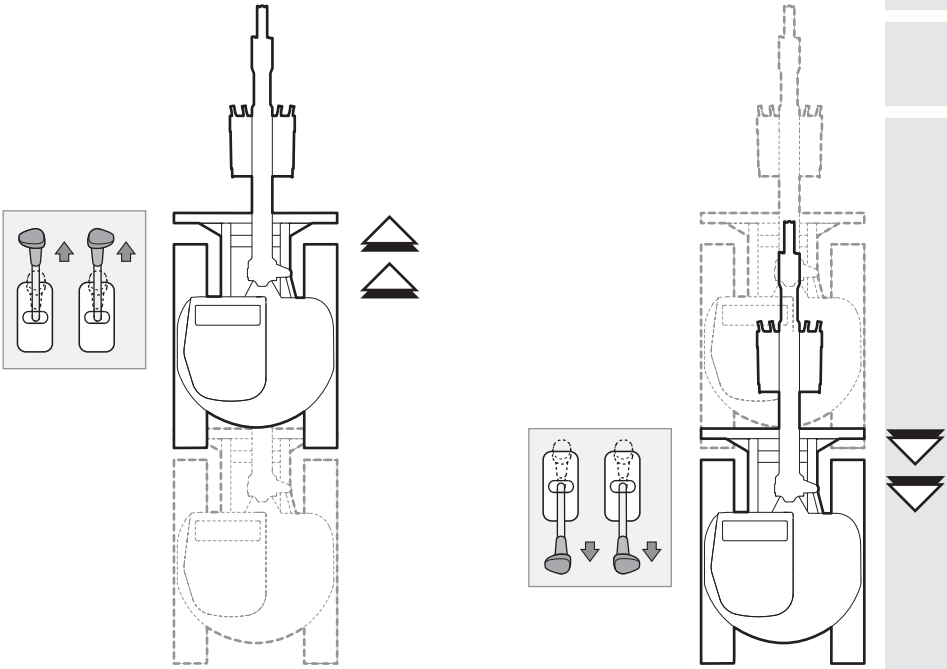
2 - raise the dozer blade to its minimum travel;

3 - check the direction in which you want to go. Move the left and right track drive levers forwards to move forwards, or backward to move in reverse.



EG-1160

7.15.1 Forward and reverse travel



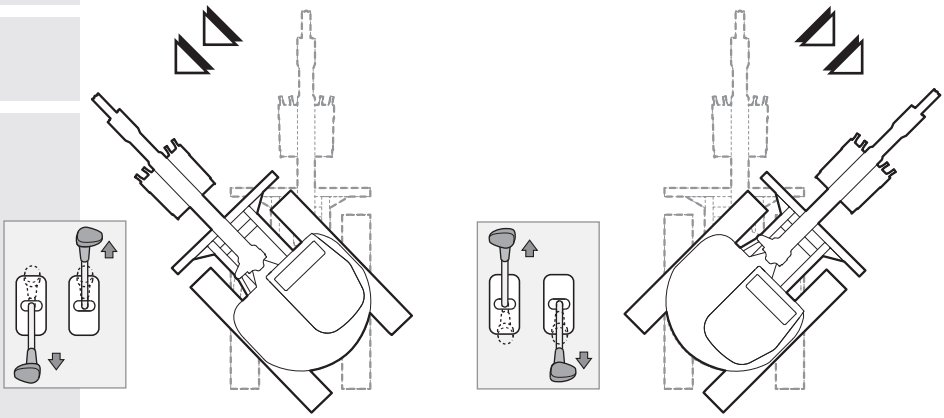
To begin FORWARD travel, move both control levers forward equally. As additional pressure is applied on the control levers, the machine's speed will increase. To STOP forward travel, slowly return both controls to their NEUTRAL (N) position.

IMPORTANT

Any forced, quick return of either travel control lever to its NEUTRAL position will cause an immediate braking response from the respective track drive.

To travel in REVERSE, slowly pull back on both control levers. The further the controls are moved, the more the speed of movement will increase. To STOP reverse travel, slowly return both controls to their NEUTRAL (N) position.

7.15.2 Making pivot turns



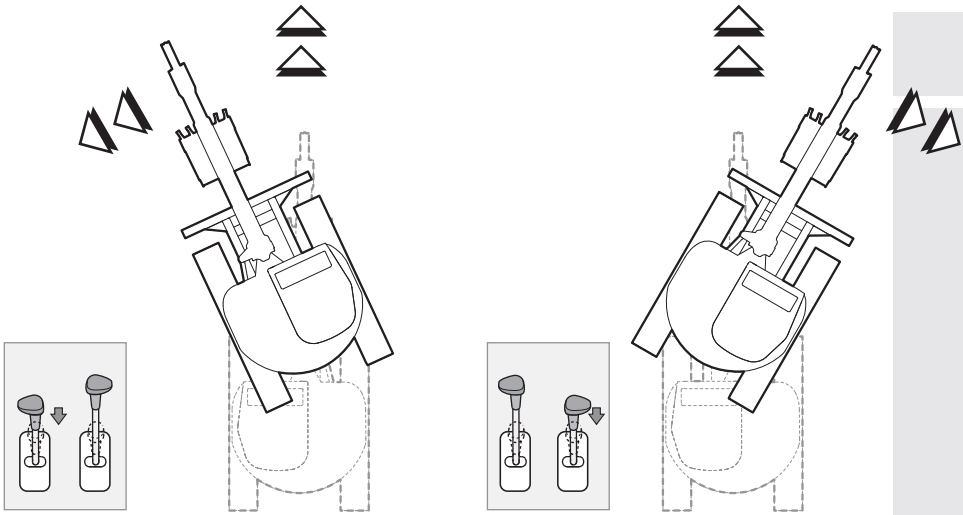
EG-0690

- To pivot the vehicle to the LEFT on its axis, push the right control lever forward while pulling the left lever to the rear.
- To pivot the vehicle to the RIGHT on its axis, push the left control lever forward while pulling the right lever to the rear.

Pivot or spin turns cannot be carried out at high speed.

Executing spin turns on a concrete surface may damage the rubber tread and the relative undercarriage components.

7.15.3 Turning while moving forward

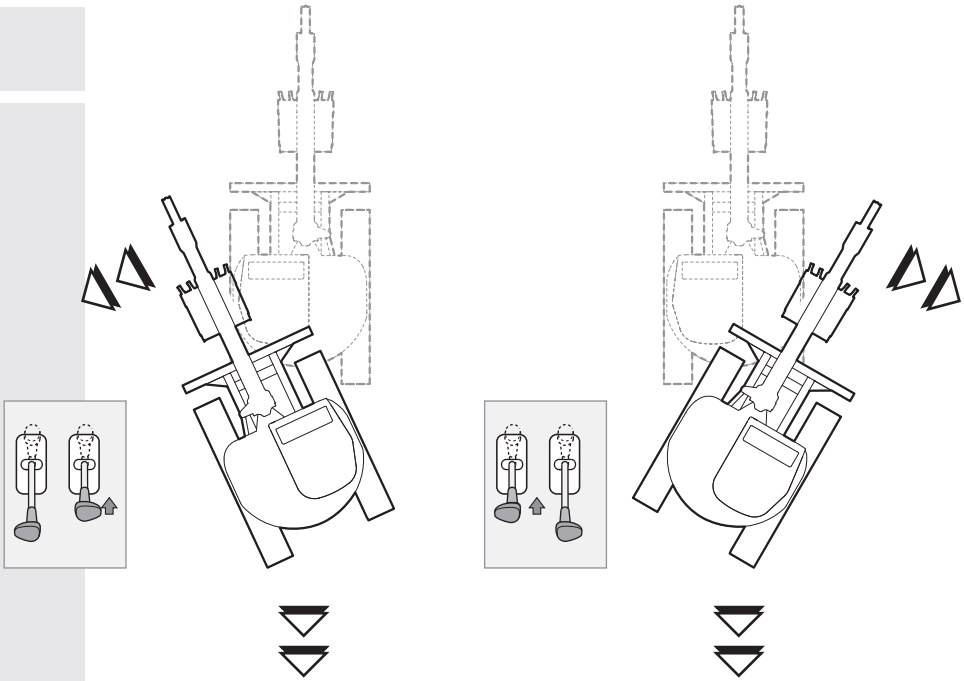


EG-0700

With the vehicle travelling straight AHEAD, both control levers must be pushed forward by equal amounts.

- To turn LEFT while travelling FORWARD, reduce forward pressure slightly on the left hand lever, thus slowing down the left track. The vehicle will turn toward the LEFT.
- To turn RIGHT while travelling FORWARD, reduce forward pressure slightly on the right hand lever so that the vehicle will turn toward the RIGHT.

7.15.4 Turning while reversing



EG-0710

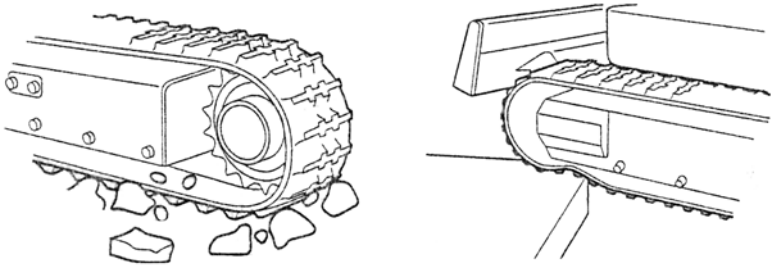
With the vehicle moving straight in REVERSE, both control levers must be pulled back by equal amounts..

- To turn LEFT while REVERSING, reduce rearward pressure slightly on the right hand lever, thus reducing the speed of the right track.
  The vehicle will turn toward the LEFT.
- To turn RIGHT while REVERSING, reduce rearward pressure slightly on the left hand lever so that the vehicle will turn toward the RIGHT.

7.15.5 Precautions when working with rubber tracks

When moving, do not ride over or turn on any sharp edges or steps.

If you drive over or turn on a projecting edge or on steps, the machine will place additional strain on the rubber track, splitting or cutting the treads of the rubber track and the inner steel cord.



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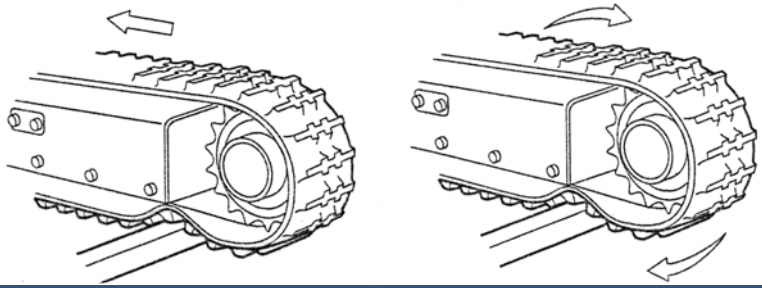
- **Prevent any foreign bodies from getting into the rubber track** as they may cause twisting or cuts.



EG-0630

- Do not turn sharply on high-friction road surfaces such as concrete roads.
- If any fuel or hydraulic fluid is spilt onto the rubber track, it must be cleaned off.
- Do not operate on the beach. (Internal metal parts will rust due to salt corrosion.)
- All of the above precautions are applicable to both rubber tracks and the optional steel tracks.

WARNING

Exercise extreme caution when operating a machine with rubber pads. Rubber pads are no more stable than steel ones due to their flexibility.

CAUTION

Rubber pads can also easily slip on iced or snow-covered surfaces. Exercise extreme caution when travelling and working in these conditions.

WARNING

Driving or slewing over projecting or other similar edges causes the rubber pad to slacken, which will probably cause it to come off the guides or cut the inner steel cord.
Driving and slewing with the track roller banked against the rubber pad may cause the rubber pad to come off the guides.

7.16 Parking the machine

Drive the machine to an area with a firm surface and level the area if necessary.

Lower the bucket or the equipment to the ground.

Proceed with shutting down the engine in accordance with the procedures specified in "point 7.12".

Then turn the starter switch to the OFF position and remove the key.

Pull the control cut-out lever (upwards), ensuring that it comes up all the way.

Close all the windows (if fitted).

Close and lock the cab door (if present) and the hatches stated in point 9.2.

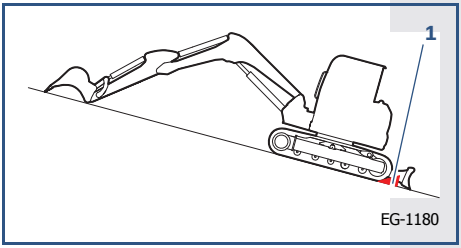
IMPORTANT

Inside the swivel motor, there is a negative mechanical brake, consequently with the heat engine turned off it is impossible to turn the turret and there is no need to activate it manually.

WARNING

Wherever possible, avoid parking the machine on an incline.

Should it be unavoidable to park the machine on an incline, in addition to the above:



- ensure that the bucket teeth are dug into the ground;
- point the blade down the slope and dig it in the ground
- block both tracks appropriately (using wedges **1**), as shown in the figure.

IMPORTANT

Always ensure that electrical components in the cab are protected against bad weather by ensuring that all windows, the sunroof and the access door are properly closed.

7.17 Operating the digging boom

CAUTION

The joystick controls operate the vehicle's boom, dipper stick, bucket and turret swing.

The functions of both controls are locked out when the servo-control cut-out lever is raised to allow entry or exit from the vehicle. To enable both joysticks, the control cut-out lever must be fully lowered, see the procedure in point 7.6

IMPORTANT

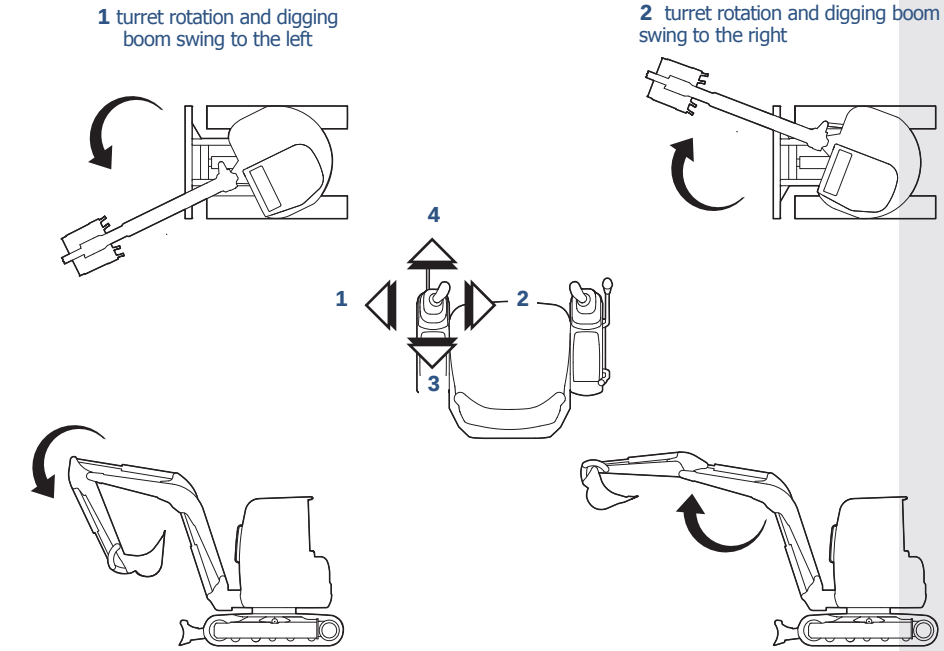
DO NOT leave any of the hydraulic controls engaged after the cylinder reaches its limit stop in any direction. This practice forces the hydraulic oil to pass through the main relief valve, causing a rapid build-up of heat in the system resulting in overheating and loss of power, in addition to reducing component life.

Certain boom and dipper stick movements are equipped with a shock-damping feature that slows down the hydraulic cylinder travel when nearing the end of its run. This minimises the shock load to the vehicle during operations.

7.17.1 Left Joystick

The left joystick controls the extension and retraction of the dipper stick, as well as the RH and LH rotation of the digging boom and turret.

- moving the left joystick to the LEFT will swing the turret to the left (**1** - counter-clockwise direction);
- moving the left joystick to the RIGHT will swing the turret to the right (**2**- clockwise direction);
- pulling the left joystick BACKWARDS will lower the dipper stick (**3**);
- pushing the left joystick FORWARDS will raise the dipper stick (**4**).


1 turret rotation and digging boom swing to the left
2 turret rotation and digging boom swing to the right
4
1
2
3
3 position of the dipper stick when closed
4 position of the dipper stick when open
EG-0720

IMPORTANT

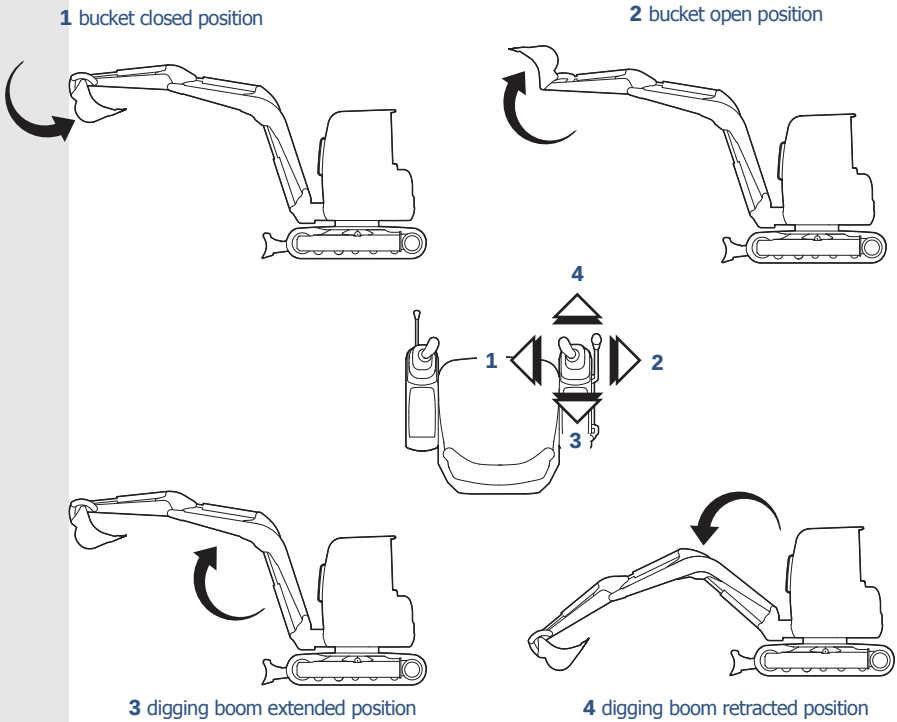
The horn button is located at the top of the left joystick handgrip.

When the joystick is in the neutral position (in the centre), the turret swing service brake is automatically activated; This braking is of a mechanical type (negative) and is therefore always on during normal machine use, also acting as a parking brake.

7.17.2 Right joystick

The right joystick controls the raising and lowering of the digging boom and controls the movement of the bucket. The bucket works according to the deviators on the dipper stick which must be in DIG mode.

- moving the right joystick to the LEFT will tilt the bucket to the closed position (**1**)
- moving the right joystick to the RIGHT will tilt the bucket to the open position (**2**)
- pushing the right joystick FORWARD will extend the digging boom (**3**)
- pulling the right joystick BACKWARD will retract the digging boom (**4**).



EG-0730

IMPORTANT

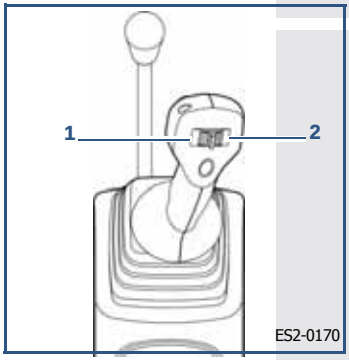
Always check the position of the deviators on the digging boom before starting work. To move the bucket they must be in DIG mode, see the procedure inpoint 7.20.

7.18 Swing roller

The electric roller located on the left joystick is used to turn the digging boom to the left or to the right of the turret frame; this boom movement is called the swing.

To activate the command:

- press the roller (**1**) to the left to swing the digging boom to the left;
- release the roller when the digging boom has reached the required position;
- press the roller (**2**) to the right to swing the digging boom to the right.
- release the roller when the digging boom has reached the required position;



IMPORTANT

DO NOT leave any of the hydraulic controls engaged after the cylinder reaches its limit stop in any direction. This practice forces the hydraulic oil to pass through the main relief valve, causing a rapid build-up of heat in the system resulting in overheating and loss of power, in addition to reducing component life.

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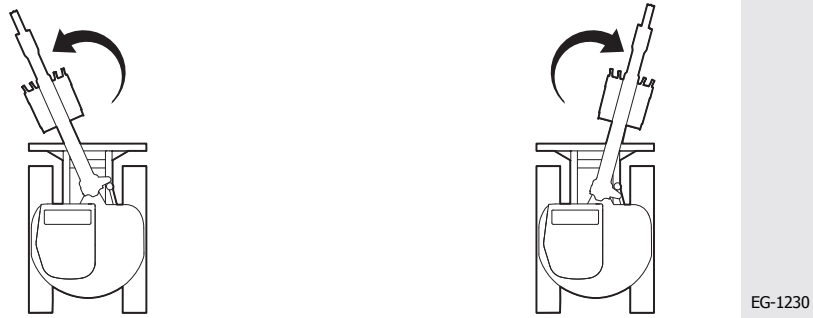


1 - pressing the roller to the left swings the digging boom to the left side.

2 - pressing the roller to the right swings the digging boom to the right side.

IMPORTANT

The hydraulic system is equipped with a shock absorber that reduces the speed of the boom's travel when the cylinders approach their limit stops.

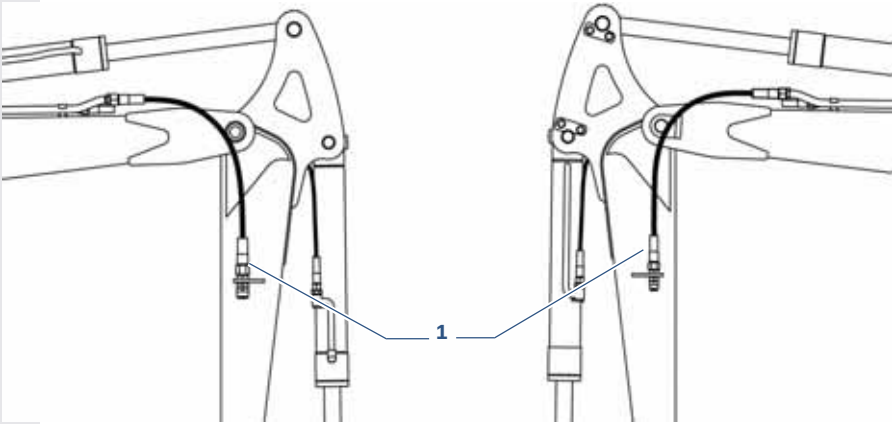
7.19 Auxiliary hydraulic system

The auxiliary hydraulic system consists of two pipes which terminate at the taps (**1**) fitted to the dipper stick, one on the right and one on the left. It has two possible operating modes; single-acting mode and double acting mode. Switching between the two modes is done manually by means of a 3-way valve, to turn it use the appropriate box spanner supplied with the machine, following the instructions in point 7.19.1 and point 7.19.2.

The single-acting auxiliary hydraulic system provides a continuous supply of hydraulic fluid to a pipe, while the other is discharged directly into the tank, the system used for equipment such as demolition hammers.

The double-acting auxiliary hydraulic system provides pressure alternately to one of two outlets, the system used for equipment such as augers or swinging buckets.

The auxiliary hydraulic circuit is able to provide a hydraulic accessory with a maximum fluid flow rate of 68 l/min . Set the fluid flow-rate using the throttle lever; if the demolition hammer is being used, the manufacturer's recommended flow rate should not be exceeded, since the reciprocating motion and pulses caused in the hydraulic system by the hammer are detrimental to the system.



RIGHT side of boom **LEFT side of boom** ES2-0410

CONNECTION TO THE HYDRAULIC CIRCUIT

WARNING

Read the contents of the equipment instruction manual carefully before using the machine or carrying out any maintenance operations.

WARNING

Never connect any equipment to the hydraulic lines before it is correctly installed mechanically and locked in place on the machine dipper stick.

Before carrying out any work on the hydraulic circuit stop the engine and discharge the residual pressure to the equipment, by repeatedly moving the controls, and the oil tank and then slowly unscrewing the filler cap.
Clean immediately any areas dirtied with oil.

The hydraulic accessories must be connected by means of hoses to the two bulkhead connectors:

- the left bulkhead connector has a male 3/4" GAS thread;
- the right bulkhead connector has a male 1/2" GAS thread.

WARNING

All equipment fitting and removal operations must be done with the machine parked on solid level ground.

When removing hydraulic connections, be very careful that impurities do not enter the pipes

Once the equipment has been installed mechanically, park the machine on solid level ground, stop the engine, discharge the residual pressure from the circuit and then proceed as follows:

1 - remove the caps fitted to the bulkhead connectors, take care not to damage or lose the parts removed;

2 - connect the pipes from the equipment to the taps, making sure that the characteristics and sizes of the fittings are the same as those prescribed.

IMPORTANT

As far as the threads and functions of the equipment connections are concerned, see the manufacturer's manual.

3 - After connecting the hoses, start the engine and allow it to idle at low revs for at least 10 minutes;

4 - Lift the equipment off the ground and send pressurised oil for around 10 times, alternately to the two connections, in order to purge any air left ion the circuit;

5 - after purging the air, stop the engine and wait at least 5 minutes beforecommencing work. This will eliminate any air bubbles that have built up in the tank;

6 - make sure there are no oil leaks and clean up any oil spilled.

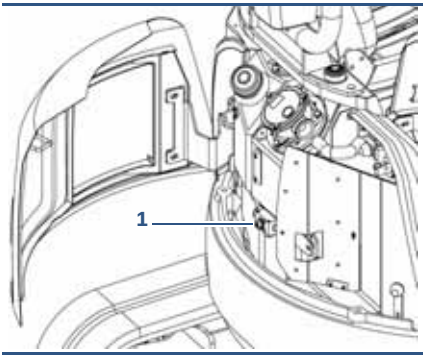
IMPORTANT

For any doubts that may arise concerning the connection of the equipment to the hydraulic circuit, contact the EUROCOMACH service centre.

If the equipment has reached its end of travel do not keep the roller pressed down for long periods.
This will cause the hydraulic system to be put under pressure needlessly and the oil may overheat.

7.19.1 Single-acting mode

When the three-way valve is moved to position **1** single-acting mode is selected (**2**), whereby pressure is supplied to the left connection only, while the right connection remains without pressure.



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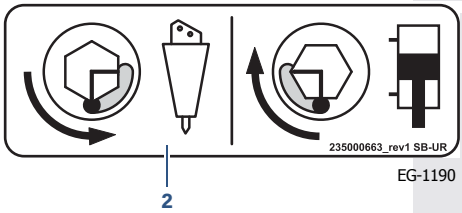

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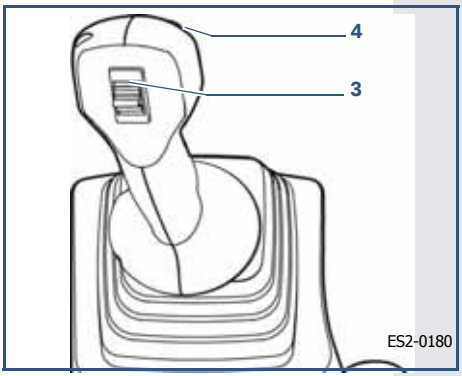
To operate the accessories:



ES2-0180

1 - push the roller(**3**) UP and hold it there to provide a constant flow of hydraulic fluid to the left pipe;

2 - release the roller to stop the flow;

3 - while pressing the roller the automatic hold can be activated by pressing the red button (**4**) under the joystick, so the control will remain on without having to keep it pressed up; the automatic hold for the oil flow to the equipment can be activated at any stage of the roller travel, in this way making it possible to provide a partial flow and keep it constant at the required level.

4 - to deactivate the hold press again button (**4**), or move the roller (**3**) to its neutral position;

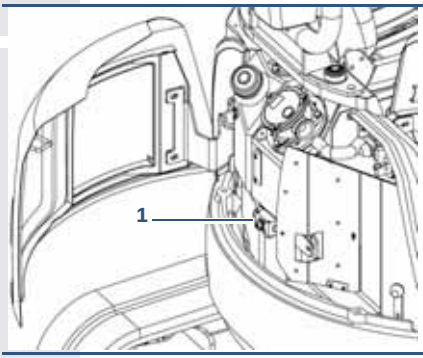
5 - no function is enabled by pressing the auxiliary hydraulic control roller down if activated in single-acting mode.

WARNING

DO NOT keep the roller pressed down for long periods. The hydraulic circuit does not activate any function but is still under pressure and so there is the risk of the hydraulic fluid overheating.

7.19.2 Double acting mode

Turning the three-way valve to posi tion **1** selects the double-a cting mode (**2**), which allows the flow to be reversed, while one of the pipes is pressur ised, the other is discharged.



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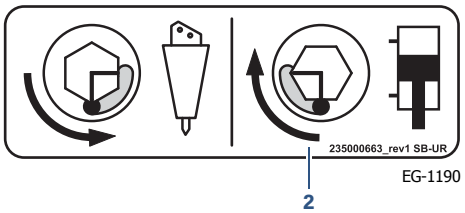

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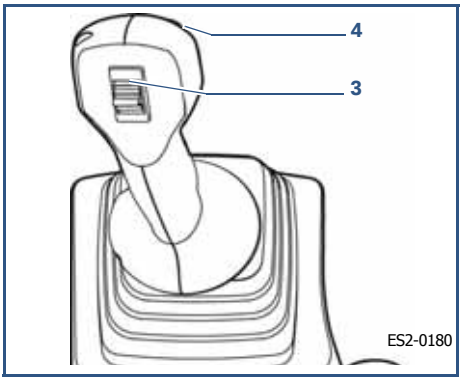
To operate the equipment:



ES2-0180

1 - push the roller(**3**) UP and hold it there to provide a constant flow of hydraulic fluid to the left pipe;

2 - release the roller to stop the flow;

3 - while pressing the roller the automatic hold can be ac tivated by pr essing the red button (**4**) und er the joystick, so the control will remain on without having to keep it pr essed up; the automatic hold for the oil flow to the equipment ca n be ac tivated at any stage of the roller travel, in this way making it possible to provide a partial flow and keep it constant at the required level;

4 - to deactivate the hold press a gain button (**4**), or move the roller (**3**) to its neutral position;

5 - in this way, pushing the auxiliary hydraulic command roller DOWNWARDS the flow of oil used is inverted, pressurising the side previously discharged and vice versa.

IMPORTANT

The automatic hold can be activated for both directions of circuit operation.

7.20 Dozer blade adjustment lever

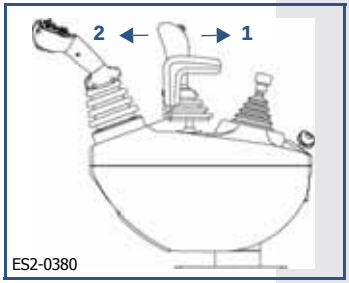
WARNING

Before making any machine movements, make sure the dozer blade is raised completely.

This lever controls the raising/lowering of the dozer blade.

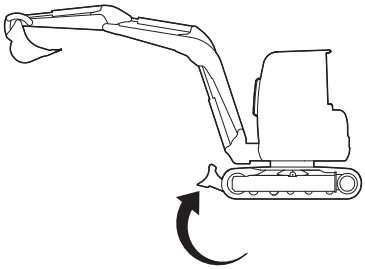
1 - Raising: pull the lever back.

2 - lowering: push the lever forwards.

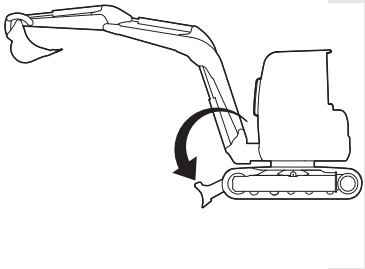


IMPORTANT

All movements are inhibited when the servo-control cut-out lever is in the Up position (see point 7.6).



1 dozer blade raised position



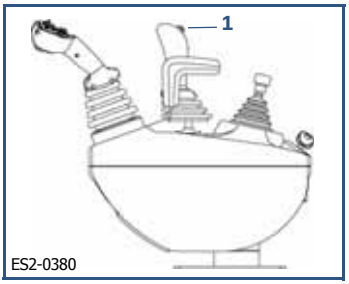
2 dozer blade lowered position

EG-1240

IMPORTANT

Before starting any digging operation, LOWER the dozer blade until it is completely touching the ground.
When parking the machine, the dozer blade must be LOWERED to the ground.

7.21 Fast drive mode



This vehicle is equipped with a system that, if engaged, allows an increase in the speed of travel, both forwards and in reverse.

The upper pushbutton-switch (**1**) of the dozer blade control lever controls the operation of the travel speed regulation system.

The system is engaged by pressing the top button on the dozer blade lever, releasing it when the command stays on.

An indicator light on the dashboard will light up when the system is engaged. The system can be engaged either at standstill or while in motion. Pressing the activation button again will disengage the system, and the driving speed automatically reverts to the minimum.

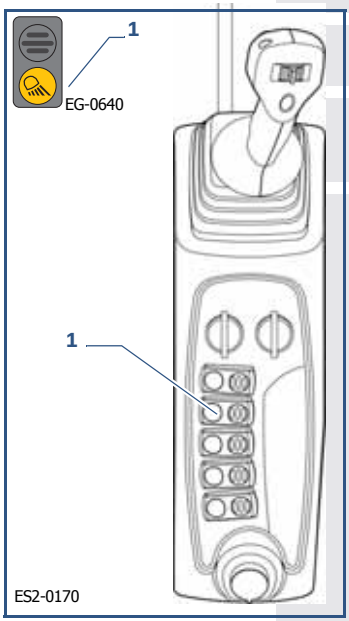
There is also an "auto shift down" function, which activates automatically as the tractive effort increases and puts the machine back into slow speed once an effort threshold is exceeded; when the effort lowers the machine goes back to fast speed. This function only works if the fast speed is engaged and cannot be disabled.

7.22 Work lights

The vehicle has a work light located on the boom.

The light is contr olled using switch (**1**) located on the left console.

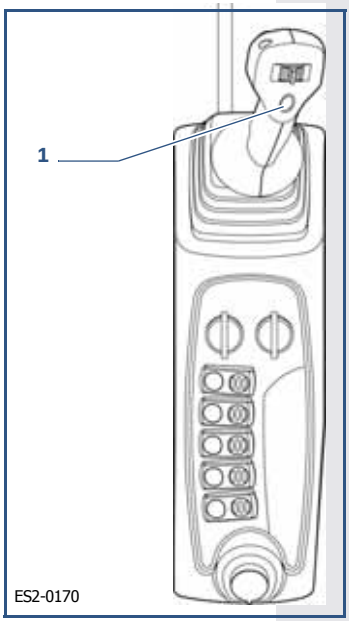
Turn the switch ON to turn the light on and OFF to turn it off.



7.23 Horn

The horn button(**1**) is located at the bottom of the left joystick and is activated when the ignition key switch is set to the "RUN" position".

Sound the horn every time you climb aboard and start working, use it especially when it is noticed that anyone in the vicinity is in danger.



7.24 Procedure for installing and removing the supplementary ballast

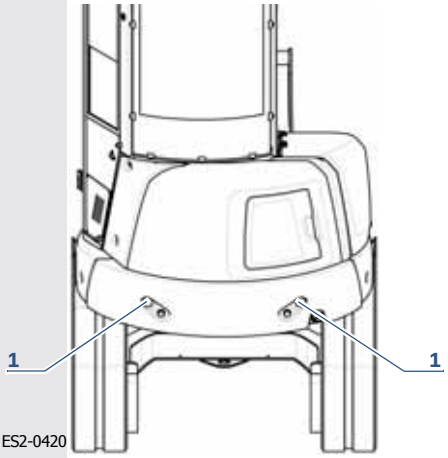
⚠ WARNING

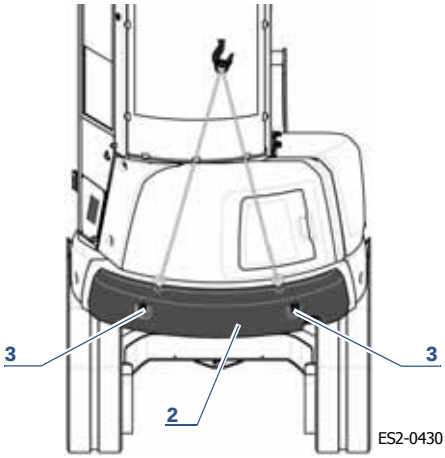
To lift the supplementary ballast use adequately sized cables; never use cables that show signs of wear or have broken strands.
Do not lift the supplementary ballast differently than as illustrated below; there is the risk of losing balance.
When lifting the supplementary ballast , make sure it is well balanced and, that it is being lifted evenly and that no one approaches the load.
Before lifting the supplementary ballast, make sure the eyebolts are correctly secured to the top holes.
When a supplementary ballast is installed, the overall machine weight changes. Take this into consideration when transporting the machine.
To lift the ballast use a cable, and eyebolts of sufficient size.

1 - Remove the reflectors **1**.

2 - Lift with a crane and fit the supplementary ballast (**2**) to the back of the standard ballast.

3 - Fit the bolts (**3**).





IMPORTANT

Use bolts of suitable size and length.

7.25 Emergency lifting-boom lowering procedure

CAUTION

Ensure that nobody is standing under or near the front accessory before and while the lifting-boom is being lowered.

This procedure is to be carried out if the engine stops and cannot be restarted or, if any other failure occurs that stops the machine with the booms and equipment not resting on the ground.

Lower the lifting boom in the following manner until the bucket or equipment are resting on the ground:

1 - turn the starter switch (ignition key) to the **ON** position;

2 - lower the servo-control cut-out lever;

3 - moving the right hand side joystick control forwards will cause the main boom to begin descending;

4 - keep the joystick pushed forwards until the equipment reaches the ground.

CAUTION

If in carrying out the above procedure the boom does not lower to a position where the equipment is resting on the ground, contact the EUROCOMACH service centre. IN THE MEANTIME DO NOT ALLOW ANYONE TO COME NEAR TO THE BOOM.

7.26 Daily storage

Park the excavator on a firm, horizontal surface, in an area where it will not hinder other operators, in accordance with the procedures specified in "point 7.16". Minimise obstruction by lowering the digging boom and resting the dozer blade on the ground.

Move all the controls to their respective rest position and remove the ignition key.

8.0 Authorised optional equipment

CAUTION

If optional equipment is fitted and used, read the relative user manual carefully and follow strictly the instructions contained in it.

Use only optional or special equipment recommended by EUROCOMACH and complying with the specifications given in the table in point 8.1.1.

For any damage, accidents or reduced machine efficiency caused by the use of unauthorised equipment, EUROCOMACH cannot be held responsible.

8.1 Safety precautions

The installation of accessories or optionals other than those authorised by EUROCOMACH not only compromises the machine life, but can also cause safety problems.

When installing accessories not indicated in this use and maintenance manual, it is best to contact the EUROCOMACH service centre.

Otherwise, EUROCOMACH declines all responsibility for accidents or damage.

The use of equipment on the vehicle can affect its stability.

The stability of the centre of gravity depends on the dimensions and weight of the vehicle with the accessory, as well as on the weight and position of any resulting loads applied to the vehicle (load capacity).

The load capacities for this vehicle are listed in the relative tables in the "Technical Specifications" section"; always refer to this table.

The machine load capacity is reduced by the weight of the equipment installed.

Third party accessory suppliers may or may not supply accessory load capacity tables. The rated load capacity values for this type of accessory must be requested from these suppliers.

Eurocomach does not issue any declarations nor grant any implicit or explicit warranties with regard to the design, manufacture or suitability of accessories supplied by third parties for use on the vehicle. This vehicle does not envisage the use of, and must not be used with, any accessories that affect the stability of the centre of gravity and exceed the maximum permitted load capacity for the vehicle.

WARNING

When removing or installing equipment, take the following precautions and pay attention to safety conditions during the operations.

Carry out the installation and dismantling operations on a solid level surface.

Where the operations are carried out by two or more operators, agree on signals to be given for communication and follow them during the operations.

Use a crane to move objects weighing in excess of 25 kg.

Always support heavy parts before removing them. When lifting heavy parts, always pay attention to the position of the centre of gravity.

WARNING

It is dangerous to carry out operations with suspended loads Always place the load on a support and check that it has been set down safely.

When installing or removing equipment, make sure it is positioned in a stable manner and so that it cannot fall.

Never pass under a load suspended by a crane. Always choose a safe position in order not to run any risks if the load should drop.

Keep unauthorised people out of the equipment storage area.

IMPORTANT

Cranes should only be operated by specialised persons. Never allow non specialised persons to use a crane.

For further information on installation and dismantling operations, contact the EUROCOMACH service centre.

8.1.1 Specifications of authorised equipment

CAUTION

Use only equipment authorised by EUROCOMACH.

Pay particular attention to safety criteria and, before starting any operations, (in a safe place) perform a test to check the operating area of the equipment and its centre of gravity.

Some equipment, when in the fully retracted position, could interfere with certain parts of the machine (in particular with the operator cab). Therefore be attentive at all times so no impact occurs.

MODEL ES28ZT:

BUCKETS / QUICK RELEASE ATTACHMENTS	WIDTH (mm)	WEIGHT WHEN EMPTY (kg)	CAPACITY (Lt)
Backhoe	300	40	33
Backhoe (standard)	400	47	48
Backhoe	500	54	65
Backhoe	600	60	82
Backhoe	700	65	100
Backhoe	800	74	117
Ditch cleaning bucket	1000	82	125
Ditch cleaning bucket	1200	96	154
Pivoting trench-clearing bucket	1000	142	125
Pivoting trench-clearing bucket	1200	154	154
Trapezoidal bucket	45°	86	94
Mechanical or hydraulic quick-release attachment	AR 30	22	-
Mechanical or hydraulic quick-release attachment	CR 30	27	-
Mechanical or hydraulic quick-release attachment	CS 30	34	-
Mechanical or hydraulic quick-release attachment	KLAC MOD. D	26	-

MODEL ES35ZT - ES40ZT:

BUCKETS / QUICK RELEASE ATTACHMENTS	WIDTH (mm)	WEIGHT WHEN EMPTY (kg)	CAPACITY (Lt)
Backhoe	300	52	41
Backhoe (standard ES35ZT)	400	60	61
Backhoe (standard ES40ZT)	500	71	82
Backhoe	600	78	105
Backhoe	700	87	127
Backhoe	800	97	152
Ditch cleaning bucket	1000	83	125
Ditch cleaning bucket	1200	96	154
Ditch cleaning bucket (solo ES40ZT)	1400	110	182
Pivoting trench-clearing bucket	1000	142	125
Pivoting trench-clearing bucket	1200	154	154
Trapezoidal bucket	45°	86	173
Mechanical or hydraulic quick-release attachment	AR 40	27	-
Mechanical or hydraulic quick-release attachment	CR 40	29	-
Mechanical or hydraulic quick-release attachment	CS 30	34	-
Mechanical or hydraulic quick-release attachment (solo ES35ZT)	KLAC MOD. D	26	-
Mechanical or hydraulic quick-release attachment (solo ES40ZT)	KLAC MOD. E	46	-

IMPORTANT

For backhoes the same weight and capacity can be considered with all types of quick-release attachment available.

EQUIPMENT	MAX DIMENSIONS		MAX WORKING PRESSURE (bar)	MAX OIL FLOW RATE (l/min)	MAX WEIGHT (kg)	MACHINE
	WIDTH mm	HEIGHT mm				
Demolition breaker	-	-	210	60	160	ALL
Bush cutter	1000	-	210	60	-	TUTTE
Tar cutter	200	-	210	60	-	ES40ZT
Bough shears*	1310	-	210	60	120	TUTTE
Sorting grapple*	900	-	210	60	155	ES28ZT ES35ZT
Sorting grapple*	1000	-	210	60	210	ES40ZT
Grapple*	1500	-	210	60	180	TUTTE
Crushing grapple	300	-	210	60	150	TUTTE
Demolition grapple	360	-	210	60	240	ES28ZT ES35ZT
Shears	195	-	210	60	380	ES40ZT
Auger	Ø 350	-	210	60	100	TUTTE
Chain excavator	-	600	210	60	165	ES28ZT ES35ZT
Chain excavator	-	850	210	60	260	ES40ZT

IMPORTANT

The total weight of the equipment with material loaded and any quick release attachment must not exceed the value of the lifting capacity.
Total weight = bucket weight (+ any quick release attachment) + [capacity x material density].

The specific weight considered "standard" for earth and rubble is 1.8 t/m^3.

Always consider a specific weight suitable for the material you are working with.

The maximum weight permitted for the equipment is equal to the nominal load capacity given in the table in point 4.8.

DANGER

**** In order to install the bough shears, the grapple or any type of grab for moving material, the machine must be certificated for moving loads.***
An integrative user manual must be provided with all the indications for safety and the procedures to be followed while lifting loads.
Making the machine compliant with regulations as a lifting apparatus is the responsibility of the equipment installer.

8.2 Bucket

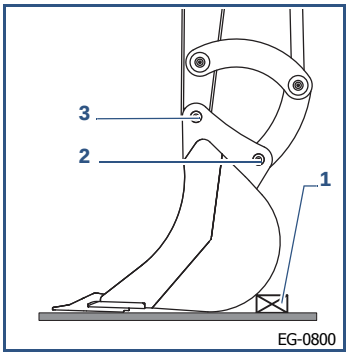
Several types of bucket are available from the EUROCOMACH service centres. Specifications for these buckets can be found in point 8.1.1 of this manual.

8.2.1 Bucket removal and replacement

CAUTION

To avoid personal injury from loose material or flying debris, always wear safety glasses and proper protective clothing when removing or reinstalling pivot pins.

To remove the bucket, proceed as follows:



1 - Where necessary, move the vehicle to level ground.

2 - Lower the digging boom, positioning the dipper stick and bucket so that the latter is resting on the ground, as illustrated.

3 - Block the bucket (**1**) so that it remains in this position while both the bucket pivot pins are being removed.

4 - Remove both pins (**2-3**) and raise the dipper stick in order to free the bucket, thereby completing the operation.

To fit the bucket, proceed as follows:

1 - The bucket must be securely blocked (**1**) and resting on the ground, as illustrated.

2 - Clean both pivot pins and their mounting holes (**2-3**).

3 - Align the dipper stick with the bucket pivot pin mounting holes (**2**). Install the pin and secure.

4 - Align the bucket linkage with the mounting holes for the second pivot pin (**3**). Install the pin and secure.

5 - Grease both pivot pins. Start the engine, and move the bucket back and forth to ensure that it operates smoothly.

If there is no abnormal friction or jamming when moving the bucket, this means that the operation has been carried out correctly; if not, repeat the entire operation from the first point.

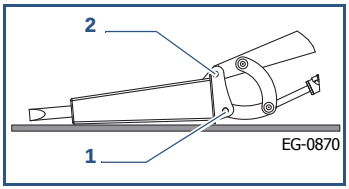
8.3 Demolition hammer

The excavator is equipped to accept the installation of a hydraulic demolition hammer. A suitable breaker must be chosen, bearing in mind its intended use.

The excavator is subject to increased strain when operating with this accessory and, since the hammer is heavier than the bucket, the machine's balance will be affected.

The local EUROCOMACH service centre is able to supply a variety of demolition hammers suitable for the requirements of the job, as well as being able to regulate the flow rate and operating pressure to the levels required for the selected accessory.

8.3.1 Installation and removal of the demolition hammer



- Ensure that the demolition hammer is in a stable position, laying it on the ground as in the figure.
- Clean the pivot pins and the respective mounting holes (**1-2**).
- Align the dipper stick with the pivot pin mounting holes (**2**) of the demolition breaker. Install the pin and secure.
- Align the demolition breaker linkage with the mounting holes for the second pivot pin (**1**). Install the pin and secure.
- Grease both pivot pins. Start up the engine and move the breaker back and forth to check that it operates smoothly. If not, repeat the operations from the beginning.
- Connect the breaker feed hose to the auxiliary single-acting feeder circuit on the left hand side of the dipper stick.
  Connect the breaker discharge hose to the single-acting feeder circuit on the right hand side of the dipper stick (single-acting mode).

8.3.2 Precautions when using the hydraulic hammer

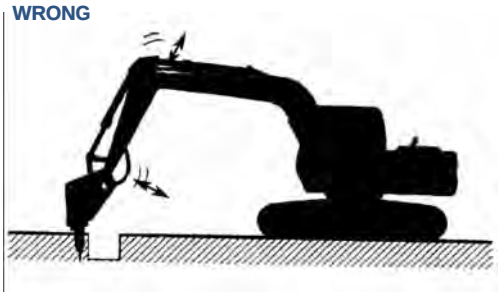
⚠ CAUTION

Since the hydraulic hammer is much heavier than the bucket, it reduces vehicle stability and increases the risk of the vehicle overturning. Whilst working, splinters or flying debris may invade the cab or other parts of the excavator. Take the following precautions and exercise extreme caution so as to prevent the occurrence of accidents that may damage the excavator and result in injury to the operator.

Avoid operating with the excavator's cylinders near their limit stop (maximum extension or retraction), so as not to damage the accessory or the cylinders themselves.

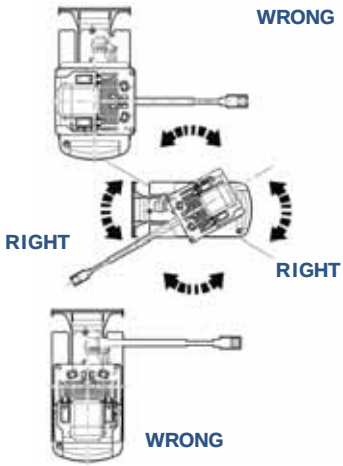
EG-0810

Stop work immediately if the hydraulic hoses bend in the wrong way. Then contact the dealer.



EG-0820

Do not operate with the hydraulic breaker in a sideways position; the machine will become unstable and the undercarriage components will be subjected to increased wear and tear.

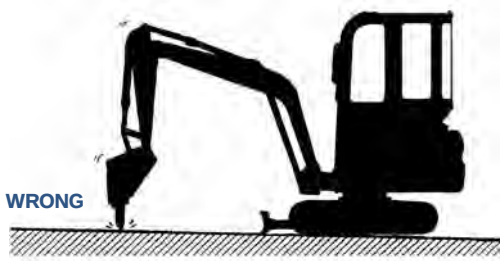


EG-0830

When operating the excavator, do not bump against the lifting boom with the hydraulic breaker.

EG-0840

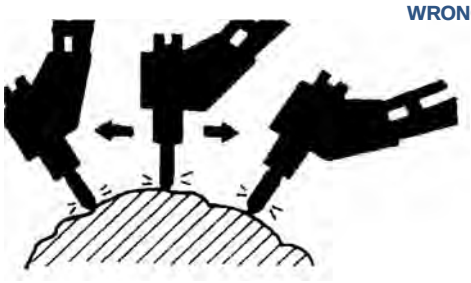
Do not engage the hydr aulic bre aker with the driving boom in a vertical position; excessive vibration on the driving cylinder may cause oil leaks.



EG-0850

Do not run the hydraulicbreaker for more than one minute at a time, since this may result in wear to the cutting edge or the hydraulics.

If the object fails to break within one minute, move the cutting edge to a new position, without remaining in one position for longer than one minute.



EG-0860

8.3.3 Operation

For operations involving the demolition breaker, refer to point 7.1 9; on purchasing this accessory, always consult the handbook provided.

8.4 Necessary tools

All the tools required for normal replacement of the bucket and/or demolition hammer are included in the tool kit supplied with the machine, and housed in the tool storage compartment.

8.5 Precautions

Whenever any of the accessories are being replaced, it is important to wear suitable clothing, such as work overalls, safety glasses and leather gloves, so as to avoid coming into contact with grease, jets of oil under pressure or, even worse, with metal splinters.

It is equally important to ensure that the accessory is resting on level ground prior to disconnection, so once freed from the machine it is unable to roll over and crash into persons or objects.

9.0 Maintenance

This section contains a complete list of requirements and procedures relating to the maintenance of this vehicle. This user manual must always accompany the vehicle. Proper maintenance involves routine procedures, with checks and inspections performed directly by the operator and/or by staff trained to carry out normal in-company maintenance, and regular services, which include cleaning, adjustment and replacement operations, carried out by staff trained for this purpose.

If you do not understand any of the information or procedures in this section, contact your local EUROCOMACH Service centre for explanations before proceeding.

YOU ARE URGED:

Do not carry out any procedure, modification or repair of any kind, except for those indicated in this manual. Only technical staff trained or authorised by the manufacturer have the necessary knowledge of the machine and the experience to carry out all the procedures correctly.

⚠ CAUTION

NEVER carry out any maintenance or servicing work on this vehicle with the engine running. Contact with moving or hot parts, or with any high-pressure fluid leaks, may cause serious injury or death.

IMPORTANT

Eurocomach recommends the adoption of good waste storage and disposal practices. Do not discharge liquids into the ground or drains, or into waste catchment areas. Use suitable containers for the collection of these liquids, then store and/or dispose of them in the safe and approved manner. Check and observe all government and/or municipal regulations regarding the storage, disposal and recycling of waste

IMPORTANT

This vehicle has been assembled using instruments based on the metric decimal system. Use metric tools of suitable type and size for the performance of maintenance and service procedures.

It is recommended that only EUROCOMACH original spare parts be used.

Any additional instruments or tools required for maintenance and adjustment purposes, and not included in the tool kit, are included in the following table.

	Part on which maintenance is carried out	Manual - 1	Hexagonal spanners set	Socket spanners 2	Allen keys for hex	Screwdriver	Pliers	Torque for oil filter	Hammer	Feeler gauge	Grease gun	Torque wrench -	Brush for battery terminals
Engine	1) Engine oil	x		x									
	2) Pump (Fuel and water)	x	x	x							x		
	3) Filter	x	x	x				x				x	
	4) Screw and nut (intake and exhaust manifold and air cleaner		x	x									
	5) Valve clearances		x			x				x			
Instrumentation	1) Amp meter		x										
	2) Temperature gauge		x										
	3) Pressure gauge		x										
Air intake, cooling, fuel supply system	1) Injection system	x	x										
	2) Radiator	x	x	x									
	3) Cylinders			x								x	
	4) Air filter	x					x						
	5) Fuel filter		x	x								x	
	6) Injectors		x	x									
	7) Fan belt		x	x							x		
Electrical system	1) Battery		x			x	x						x
	2) Lights	x	x			x	x						
	3) Ignition system		x	x							x		
	4) Alternator		x	x									
Power transmission	1) Control valve	x	x	x					x			x	
	2) Swivel motor	x	x	x								x	
	3) Travel motors			x	x				x			x	
	4) Components	x	x	x			x					x	
Inspections	1) Engine		x								x		
	2) Steering		x								x		
Undercarriage	1) Rollers			x					x		x	x	
	2) Drive gear			x					x		x	x	
	3) Idler wheel			x					x			x	
	4) Ground contact components			x					x			x	
	5) Tensioner spring			x					x			x	
	6) Track tension adjustment		x	x					x		x		
	7) Tracks			x							x	x	

1) "Manually" means that the maintenance or adjustment operation can be done by hand, without using any tools.

2) Various tools may be used to tighten the screws and nuts found on the machine.

9.1 Safety

Carry out maintenance operations on a hard, level surface.

Before doing any work on the machine, read the instructions in the manual carefully.

During maintenance operations, observe the precautions printed on the warning plates on the machine.

Do not attempt to carry out any maintenance unless you have the necessary skills, the right information, the safety gear and the instruments and equipment necessary to do the job properly.

Check that the equipment used to lift and support the machine is in good working order and is able to take the weight of the machine.

Maintenance operations must be carried out with the bucket or accessory resting on the ground.

DANGER

Do not carry out any maintenance, servicing or adjustment operations with the bucket, accessory or blade raised.

Any operations requiring that the boom, bucket or blade be raised must be carried out having ensured adequate support and restraint of the raised part in order to prevent it from falling accidentally.

Failure to comply with the safety regulations and proper maintenance procedures could cause damage or faults on the machine and result in injury or even death of the operator or other persons in the vicinity.

Before commencing with any maintenance, it is recommended that warning signs be attached to the ignition switch and/or control levers to prevent anyone inadvertently starting the engine.

Do not start the engine of the machine in inadequately ventilated, enclosed areas, so as to avoid a build-up of exhaust gases.

Before starting the machine, evacuate everyone in the area from the machine's range of action.

Never leave the machine unattended with the engine running.

Wash the machine regularly and remove all traces of accumulated grease, oil and debris, so as to prevent any form of personal injury and machine damage.

Do not spray water or steam inside the cab or anywhere near the driving position.

Clean the machine, avoiding pointing high-pressure water jets directly at the radiator.

When washing, protect the connectors of the electrical system and do not wet the ignition switch.

When working in dusty areas:

- check frequently for air filter blockage;
- clean the radiator frequently to prevent the fins from becoming blocked;
- change the diesel filter more often;
- clean electrical components; in particular, remove any dust from the alternator and starter motor.

Do not use inflammable liquids to clean any parts; avoid naked flames and do not smoke.

Keep the machine scrupulously clean; this will help to locate any faulty parts.

Keep all grease nipples, breather pipes and areas around the dipsticks particularly clean to prevent any dirt getting in.

Keeping the machine clean makes it easier to spot any oil leaks or other problems, and makes them easy to fix as soon as they occur.

Before performing any inspections or maintenance operations on the electrical system and before carrying out any welding, disconnect the battery(see procedure in point 6.6).

9.2 Access hatches and covers

Some areas that require maintenance are protected by hatches or covers that can be opened, as listed below.

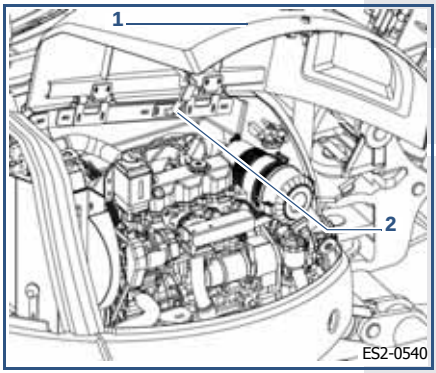
CAUTION

Do not hold access hatches and covers open when the machine is on a slope or under windy conditions. Access hatches and covers can close accidentally causing personal injury.

9.2.1 Engine cover

The engine cover (**1**) is located on the right side of the machine.

The engine cover allows access to: engine, fuel system, cooling system, air filter, filter and diesel decanter, etc...



To open the cover:

- put the key into the lock and turn it counter-clockwise;
- release the lock by pushing the key upwards and open the cover;
- when the cover is raised the latch clicks into place (**2**). The cover can now be left as it will be held in the open position by the stop;
- to close the cover again lift it upwards, press the stop and then lower it slowly until you hear the lock click;
- lock the cover by turning the key clockwise and then removing it.

WARNING

When raising the cover always check that the latch has clicked into place. If it you leave hold of the cover before it clicks, it could drop down quickly and cause injury to the operator's hands or head.

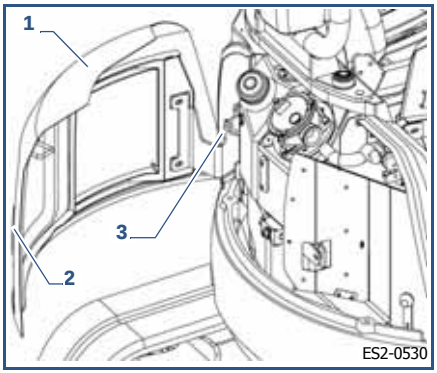
9.2.2 Rear covers

The rear cover is located at the back of the machine (**1**).

This cover allows access to: water/oil radiator, fuel tank, oil tank, 3-way flow diverter, etc...

To open the cover:

- open the engine cover (See point 9.2.1);
- release the lock by pulling lever (**2**), upwards;
- pull the cover back (**3**) until the latch clicks;
- to close the cover, lift the stop and press it until you hear the lock click into place.



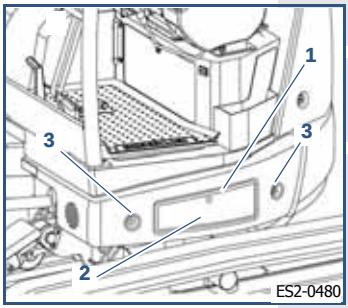
9.2.3 battery disconnection compartment hatch

The hatch is located on the left side (**1**).

This hatch allows a ccess to: battery disconnec tion switch.

To open the hatch:

- put the key into the lock and turn it counter-clockwise;
- remove the hatch by pulling it upwards;
- To refit the hatch, fit the base (**2**) into the machine and push the top part into place, lock it by turning the key clockwise and remove the key.



To access the battery remove the side panel (**1**):

- remove the screws (**3**);
- take away the side panel and rest it firmly on the ground;
- when the operation is complete put the side panel back in place and tighten thescrews (**3**).

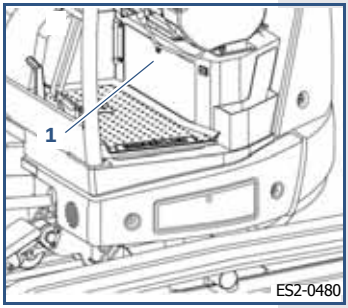
9.2.4 Glove box flap

Under the operator's seat is a metal flap (**1**).

This flap allows access to: glove box, electrical system control box, fuses.

To open the hatch:

- put the key into the lock and turn it counter-clockwise;
- tip the flap towards the front of the machine;
- to close the flap repeat the procedure in reverse order.



9.3 Engine oil

DANGER

The engine oil is very hot immediately after using the machine, therefore, wait for it to cool before performing any maintenance.

Choose the engine oil carefully and follow the applicable maintenance schedule:

- daily check;
- regular oil-change according to specifications.

Use the oils and greases recommended by EUROCOMACH and select oils that are appropriate for the ambient temperature.

Use clean oils and greases, ensure that the containers are clean and that no foreign bodies get into the oil and grease.

Do not mix different brands of oil.

If you have any oils that are different from those currently being used, do not top the oil up but rather drain all the oil and replace it with whatever oil you have available.

Inspect and change the oil in a clean area to prevent dirt from entering the tank.

When the gaskets and O-rings are removed, clean the sealing surfaces well and fit new gaskets and O-rings. When reassembling the unit, make sure the seals are fitted in the correct manner.

9.4 Fuel

Always use the appropriate fuel for the engine. Other fuels with different specifications may damage the engine or reduce power.

Always fill up at the end of the day.

When filling up, make sure there is no water on the top of the fuel drum and that the fuel pump does not draw up any condensation from the bottom of the drum.

9.5 Coolant liquid

DANGER

The coolant is hot immediately after using the machine, therefore, wait for the temperature to drop before performing any maintenance.

The machine is delivered with a water and antifreeze mixture that is suitable for use in outdoor tempera tures as low as -15°C. I f you need to use the machine at lower temperatures, change the mix to suit.

The coolant contains a ntifreeze and is infla mmable; do not use na ked fla mes near the liquid and do not smoke when filling.

Use only drinking water or tap water.

9.6 Hydraulic system

DANGER

Maintenance of the hydraulic system must be carried out with the machine parked on level ground, with the bucket resting on the ground and with the engine turned off.

Exercise extreme caution when servicing the hydraulic system because the oil is very hot just after the machine has been working.

Release air from the tank to lower the internal pressure before carrying out any maintenance on the hydraulic system; move the control levers backwards and forwards a few times.

Do not start the engine if there is no oil in the tank.

When you uncouple a hydraulic connection, label the parts so you do not make mistakes when reconnecting the fittings.

If pressurised oil squirts out through small holes, you could be sprayed by a high-pressure jet of oil, so always wear safety gloves and goggles. Use a piece of cardboard and not your hands to check for leaks.

Repair any broken or damaged pipes immediately, as they may burst while the machine is in use.

If you are sprayed by a high-pressure jet of oil, seek medical attention immediately.

The following maintenance is required on the hydraulic system:

- daily check of the oil level in the sump;
- periodic replacement of the oil filters.
- periodic oil change.

When a circuit component is dismantled, check the gaskets and the O-rings; if damaged, replace them.

When a cylinder or hydraulic circuit component is removed, bleed out the air as follows after refitting:

- start the engine and let it idle for a while.
- let all the cylinders complete several movements without letting them reach the end of their travel.
- Slowly move each cylinder to its limit stops a few times.

When replacing the hydraulic filters, carry out the following operations:

- start the engine and let it idle for a while
- loosen the pipes connecting the pump to the engine, in order to bleed the air in the system
- tighten the pipes carefully.

9.7 Electrical system

DANGER

Before doing any work on the electrical system, carefully read the battery maintenance instructions and observe the applicable instructions.
If you need to work near the radiator fan, be careful not to get too close and make sure that nothing gets caught in the fan belt or the fan itself.

If the cables are damp ortheir insulation is damaged, current will be dispersed within the electrical system, which may cause the machine to malfunction.

The following maintenance is required on the electrical system:

- check the tension of the alternator belt;
- check whether the alternator belt is damaged or broken;
- check the battery electrolyte level.

Avoid getting the electrical system wet when washing the machine or if it rains.

When you have to work near rivers, lakes or the sea for any length of time, protect the connectors with anticorrosive products.

If you must do any welding on the machine, turn off the battery disconnection switch.

9.8 Tracks

Inspect the condition of the tracks periodically and check their tension.

If the tr ack is too tight, the rolling fr iction on the drive gea r incr eases, re sulting in a reduction of mobility.

If the tr ack is too loose, it may slip off the dr ive gear and resistance increases when reversing, while the mobility decreases.

Make sur e the trac ks a re tensioned equally: a difference in tension may cause the machine to deviate from its path.

9.9 Refilling

REFILLING	TYPE		QUANTITY (litres)
Engine	Rimula R4 L 15W40 - Shell	Sigma Truck PLUS 15W40 - AGIP	7
Hydraulic oil reservoir	TELLUS T46 - Shell	Arnica 46 - AGIP	30
Hydraulic circuit	TELLUS T46 - Shell	Arnica 46 - AGIP	54
Radiator (40% -15°C)	GlycoShell - Shell	Antifreeze Spezial - AGIP	7.5 (ES28ZT-ES35ZT) 8 (ES40ZT)
Fuel tank	DIESEL		30
Travel gear motors	Spirax 80W90 - Shell	Agip Rotra MP 80W90 - AGIP	1
Grease nipples	Multiservice EP2 Grease - Shell	Grease MU EP 2 - AGIP	-
Track tensioner	Multiservice EP2 Grease - Shell	Grease MU EP 2 - AGIP	-

WARNING

Do not mix different types of oils.
Oils, filters, coolant liquids and battery fluids are pollutants that should not be released into the environment but disposed of in accordance with the environmental protection regulations in force.

IMPORTANT

Engine maintenance instructions are purely intended as an indication. For g reater precision and acc uracy, foll ow the inst ructions in th e eng ine's USER MANUAL supplied with every machine.

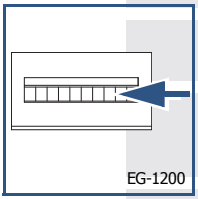
9.10 Tightening torque tables

Refer to these tables when no specific tightening torques are given. The following specifications apply to the tightening devices supplied with metric threads, either dry or oil-lubricated (Nm) [kgm].

METRIC COARSE THREADS				
SIZE	5.8	8.8	10.9	12.9
M6	0.7	1	1.45	1.75
M8	1.6	2.5	3.5	4.2
M10	3.5	4.8	6.8	8.2
M12	6	8.6	12	14.5
M14	8.5	13.5	19	23
M16	14	21.5	30	36
M18	20	29.5	41	49
M20	30	41	58	69
M22	37	55	78	93
M24	50	72	100	120
M27	65	104	145	175
M30	90	140	200	240

METRIC FINE THREADS				
SIZE	5.8	8.8	10.9	12.9
M8x1	1.8	2.7	3.8	4.4
M10x1.25	3.5	5.2	7.2	8.8
M12x1.25	6.5	9.5	13.5	16.5
M12x10.5	6.3	9	12.5	15
M14x1.5	10	15	20.5	25
M16x1.5	15	22	31	38
M18x1.5	21	32	46	55
M20x1.5	30	46	67	77
M22x1.5	40	62	88	105
M24x2	50	80	110	130
M27x2	70	110	160	190
M30x2	100	150	210	250

9.11 Regular maintenance


EG-1200

The hour meter records total engine operating hours, and should be used to schedule all maintenance procedures listed below. Read the hour meter every day.

Perform all services at the hourly intervals indica ted. Service more often if the vehicle is operated under adverse conditions.

REFERENCE	DESCRIPTION OF OPERATIONS	DAILY	EVERY 100 HOURS	EVERY 250 HOURS	EVERY 500 HOURS	EVERY 1000 HOURS
1	Check the engine oil level	X				
2	Check the coolant level	X				
3	Check the hydraulic fluid level	X				
4	Check drive gear/roller holding bolt tension		X			
5	Track tension check		X			
6	Pin lubrication points	X				
7	Check the alternator/fan belt		X			
8	Check the gear motor levels			X		
9	Check the battery fluid level			X		
10	Check whether the air filter is blocked	X				
11	Clean the radiator/heat exchanger		X			
12	Change the engine oil		X▲	X		
13	Change the engine oil filter		X▲	X		
14	Change the fuel filter		X▲	X		
15	Change the air filter		X			
16	Replacement of the hydr aulic cir cuit intake and discharge filters		X▲	X		
17	Draining the fuel tank				X	
18	Change the coolant				X	
19	Change the fluid in the hydraulic circuit					X
20	Change the oil in the gear motors					X
21	Cleaning the fuel tank					X

Only the first time ▲

Replacement of filters:

In order to identify the engine oil filter correctly, refer to the parts catalogue and/or engine operation and maintenance catalogue supplied with the machine.

9.11.1 Checking the engine oil level

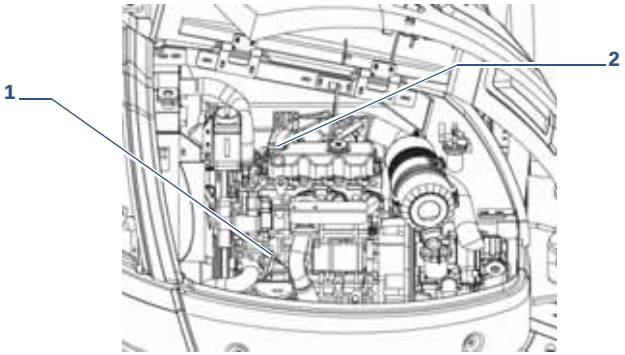
The level is checked by means of the marked dipstick (**1**) and should be between the MIN and MAX marks.

The oil level should be checked with the engine turned off and the vehicle on level ground.

If necessary, top up with oil through the filler spout (**2**)

DANGER

The recently-run engine is very hot and can cause burns; allow the engine to cool down before checking.



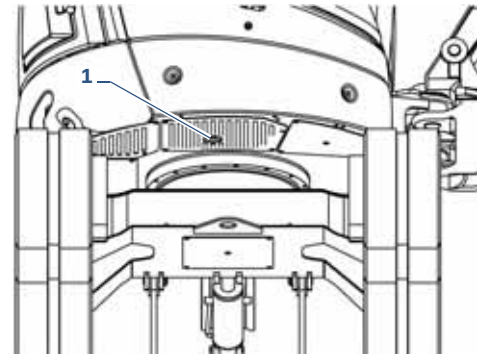
ES2-0520

9.11.2 Changing the engine oil

DANGER

When the machine has just been switched off, the engine oil is very hot and can cause burns; allow the engine to cool down before draining the oil. The oil change operation should be performed when the oil is luke warm (25÷40°), as this improves the drainage of the old oil.
When it is cold, the oil drainage may be compromised or prove to be difficult. This would result in the mixing of the old oil with the new.

- Turn the turret to bring the dozer blade to the left of the operator
- Remove the drain plug from the engine oil sump (**1**).
- Remove the oil filler cap (**2**) to help the oil to drain out.
- Clean thoroughly all the plugs (**1-2**) and the oil dipstick(**3**).
- Having replaced the oil or the filters, check for the presence of any metal particles or foreign bodies in the used oil and filters.
- Replace the sump drain plug (**1**).
- Pour in the specified amount of the type of oil recommended in the liquids table.
- Use the dipstick (**3**) to check that the level reaches the MAX mark.
- Replace the oil filler cap.
- Start the engine and let it run for a few minutes, then shut it down and check the level again.



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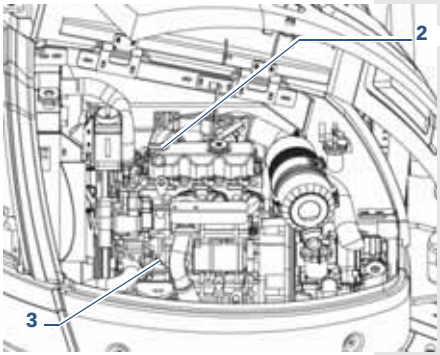


ES2-0520

CAUTION

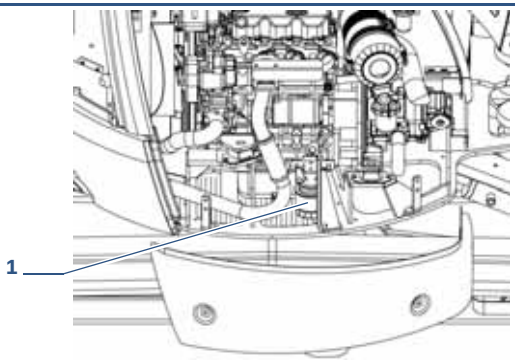
The engine oil and the associated filter are highly pollutant items; do not discard them into the environment.

9.11.3 Changing the engine oil filter

DANGER

When the machine has just been switched off, the engine oil is very hot and can cause burns; allow the engine to cool down before draining the oil.

- The oil filter (**1**) is located inside the engine compartment.
- To gain better access to it open the engine cover and remove the right side panel (**2**).
- Using the appropriate spanner, unscrew the used filter (1) and discard it.
- Clean the surrounding area and fit a new filter, screwing it on by hand.
- Start the engine, check that there are no leaks and that the low oil pressure indicator light on the control panel switches off.
- Refit the right side panel and close the engine cover



ES2-0550

WARNING

Change the oil filter every time you change the engine oil.

CAUTION

The engine oil and the associated filter are highly pollutant items; do not discard them into the environment.

9.11.4 Checking the coolant level

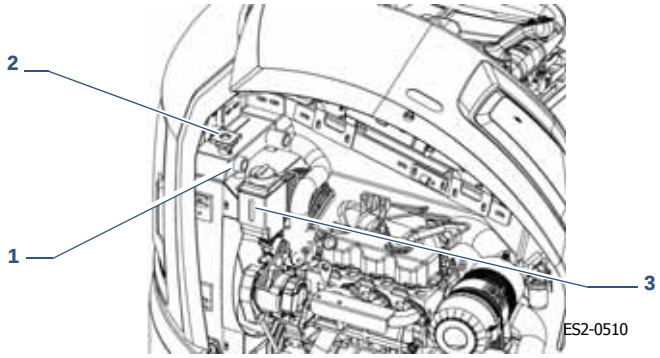
WARNING

Carry out the check with the machine parked on level ground and with the equipment resting on the ground.
Do not remove the radiator cap while the liquid is hot as it could spray out and scald the operator.
Unscrew the cap slowly to discharge the pressure before removing the cap.

The level indicator(**1**) can be accessed by opening the engine cover, see.

If the oil does not fully cover the indicator (**1**), unscrew the cap (**2**) and top it up; after doing this, replace the cap and tighten it well (**2**).

The oil must be between the MIN and MAX marks on the reservoir (**3**).



IMPORTANT

If the radiator level is low and the expansion tank is refilled with coolant, check the seals and for any air leaks in the coupling that connects the radiator and the expansion tank.
If the problem persists, contact your EUROCOMACH service centre.

WARNING

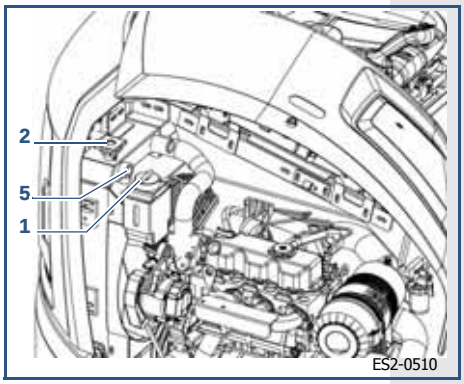
Always use the proper ratio of water to antifreeze. An excess of antifreeze reduces the efficiency of the cooling system and may cause serious early damage to the engine (see manufacturer's instructions). Insufficient antifreeze reduces the level of additives that protect the internal parts of the engine; At the same time it reduces the system's boiling point and level of protection against freezing. Always add a pre-mixed solution. Adding concentrated coolant can cause serious early damage to the engine. If the coolant level drops constantly and significantly, check the hoses between the engine and radiator, or the radiator itself, for leaks.

9.11.5 Changing the coolant

DANGER

Immediately after the machine is stopped, the coolant is very hot and under pressure, and can cause severe burns; allow the engine cool before replacing the liquid.

- Open the radiator compartment cover.
- Unscrew the cap (**1**) of t he over flow t ank and the radiator cap (**2**).
- Remove the conveyor (**3**)
- Drain o ut the liquid through the drain plug (**4**) into a suitable recipient, then dispose of it in c ompliance w ith the r egulations currently in force.
- Replace the dr ain p lug (**4**), fill the r adiator with fresh liquid through the plug (**2**).
- Refit the conveyor (**2**).
- Run the engine on minimum for 5 minutes (with the overflow tank and radiator open in order to exp el any air left inside the circuit) then stop the engine.
- Check t he coolant leve l; the level indicator(**5**) must be covered, so top up if necessary.
- Screw on the radiator cap (**2**).
- Bring t he level in the rese rvoir (**1**) to between the MIN and MAX marks.
- Close the reservoir cap (**1**).
- Start the engine and run at m aximum revs, after 10 minutes check the level again on the indicator and in the reservoir (**1**).



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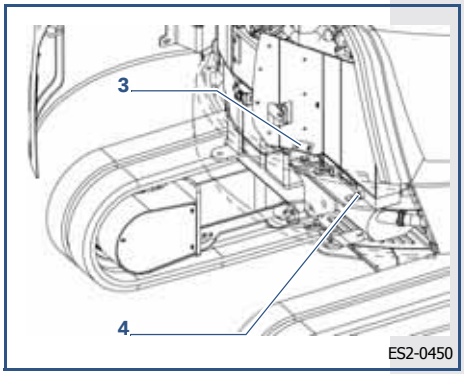

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9.11.6 Cleaingn the radiator / heat exchanger

DANGER

Complete this task with the engine switched off.
If any part of your body or a tool touches the blades of the fan, these could cut and / or snag, causing serious injuries

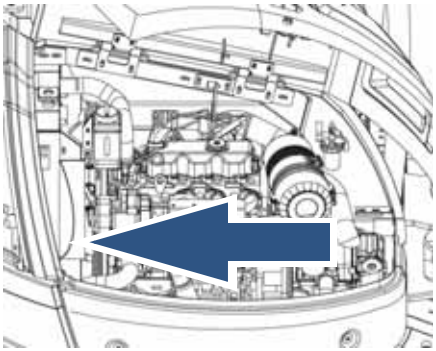
To gain access to the radiator more easily open the engine cover and the radiator cover.

Check the fins of the radiator; if they are blocked, clean them with a brush soaked in diesel fuel.

Dry from inside outwards using a jet of compressed air (max 10 bar).

If the radiator is just dusty it only needs cleaning out with compressed air.

When the procedure is complete replace the cover.



ES2-0520

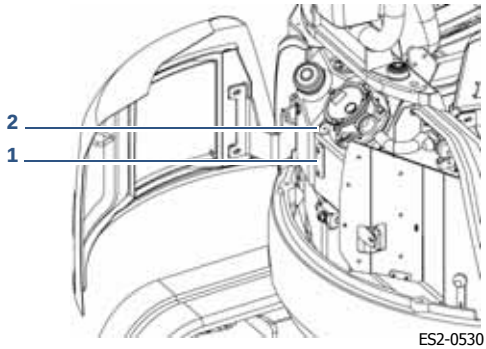
WARNING

Carry out this operation every time the radiator is accidentally dirtied with oil, diesel or other oily or greasy substances.

9.11.7 Checking the hydraulic fluid level

The level of the hydraulic fluid in the hydraulic circuit should be checked with the engine cold and the machine level; the bucket and boom cylinders should be positioned asshown in the figure. The level can be seen on the level indicator (**1**) inside the engine cover.

If necessary, add hydrauli c fluid through the appropriate filler loc ated underneath the hydraulic tank hatch (**2**).



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WARNING

The filler cap can only be opened with the applicable spanner supplied as standard.

9.11.8 Replacing the hydraulic system fluid

DANGER

When the machine has just stopped, the hydraulic fluid is very hot; allow the engine cool down before changing the fluid.
Old filters and hydraulic fluid are highly pollutant items; do not discard them into the environment, but put them in sealed containers and deliver them to the specialised waste disposal centres.

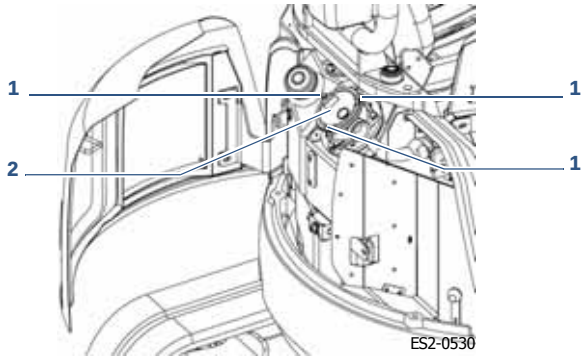
WARNING

The filter should be changed for the first time after 100 working hours and every 500 hours thereafter.

To access the filter open the oil tank flap (see the procedure inpoint 9.2.2).
Change the filter at the intervals as indicated in the applicable table in point 9.11.

- Undo the screws on the lid (**1**);
- remove the lid (**2**);
- take out the cartridge and dispose of it as directed;
- Insert a new cartridge, check the condition of the seal and fit the lid (**2**) back in place;
- tighten all the screws (**1**).

The filter housing is pressurised, so when the lid is opened only a small amount of oil will be spilt.



9.11.9 Changing the fluid in the hydraulic circuit

DANGER

When the machine has just stopped, the hydraulic fluid is very hot; allow the engine cool down before changing the fluid.
Old filters and hydraulic fluid are highly pollutant items; do not discard them into the environment, but put them in sealed containers and deliver them to the specialised waste disposal centres.

1 - The oil must be at a temperature of 30-40 °C, if it is hotter leave it to cool down or alternatively move the machine until this temperature is reached. Working with the oil at this temperature there will be no risk of being burnt and all the used oil will be drained from the system.

2 - Park the vehicle on a level surface, lower the dozer blade, close the bucket, retract the dipper stick and lower the digging boom to the ground.

3 - Shut down the engine, raise the servo-control cut-out lever, then undo the seat belt and exit from the vehicle.

4 - Open the oil tank flap, see point 9.2.4.

5 - Unscrew the filler cap (**1**) see the procedure in point 9.11.7.

6 - Unscrew the drain plug (**2**) and allow the fluid to drain out into a suitable container, dispose of in compliance with the regulations currently in force.

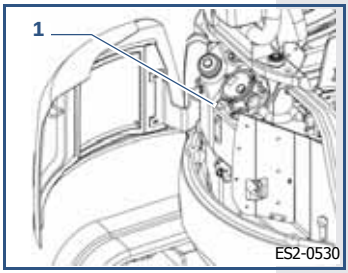
7 - Replace the hydraulic fluid filter see point 9.11.8.

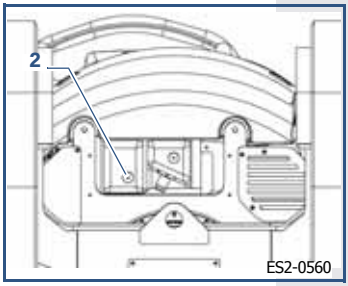
8 - Remove and clean the intake filter, see point 9.11.10.

9 - Clean the drain plug (**2**) as there may be metallic deposits from various parts on it and then put it back in place.

10 - Refit the hydraulic fluid filter and the intake filter.

11 - Fill up with oil, of the type and quantity indicated in the liquids table, until the level is reac hed and then screw on the cap (**1**).





12 - Start the engine a nd let it idle, then extend the c ylinders completely; move each cylinder several times to bleed all the air out of the system.

13 - Check the level again and top up if necessary.

⚠ WARNING

Allow the oil to cool before carrying out any maintenance.
Never start the engine with the tank empty as this will definitely damage the pump.
The filler cap can only be opened with the special safety spanner supplied as standard equipment.
Always close the caps tightly to avoid pressure leaks inside the reservoir.
Only use lubricating oils recommended by SAMPIERANA and specified by the manufacturer in the applicable table in point 9.9.

9.11.10 Cleaning the intake system oil filter

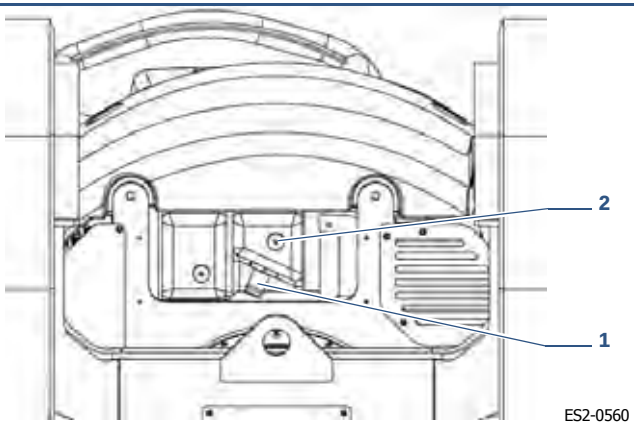
The filter (**1**) is housed inside the hydraulic fluid reservoir.

To access it remove the casing under the tanks.

To remove the intake filter, the oil must first be drained out through the drain plug located under the reservoir (**2**), when all the oil has drained out replace the cap.

Now disconnect the air intake hose and unscrew the intake filter. Clean the filter with diesel and compressed air and replace it if necessary.

Reassemble the element using the reverse procedure.



WARNING

Every 1000 hours and/or at every oil change, clean the filter element by washing it.
When working in very dusty environments, clean the filter more often.
If the movements of the boom or the bucket are jerky instead of smooth, check the cleanliness of the filter.

9.11.11 Checkin the condition of the hydraulic lines

WARNING

DO NOT run or otherwise operate the vehicle if any hydraulic hose or fitting is found to be leaking or visibly damaged. Serious injury could result from contact with hydraulic fluid expelled under extreme pressure from hoses or fittings.

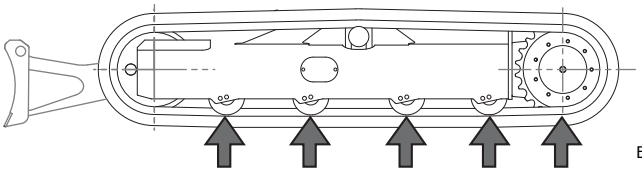
Prior to operation, walk around the vehicle and visually inspect all hydraulic pipes, hoses and fittings for signs of damage or leakage.

Wearing suitable hand, face and body protection, hold a piece of cardboard to the suspect area to determine whether there are any leaks.

If the leak is confirmed or there is other damage, do not use the machine until appropriate repairs have been made.

9.11.12 Checking the drive gear / roller holding bolt

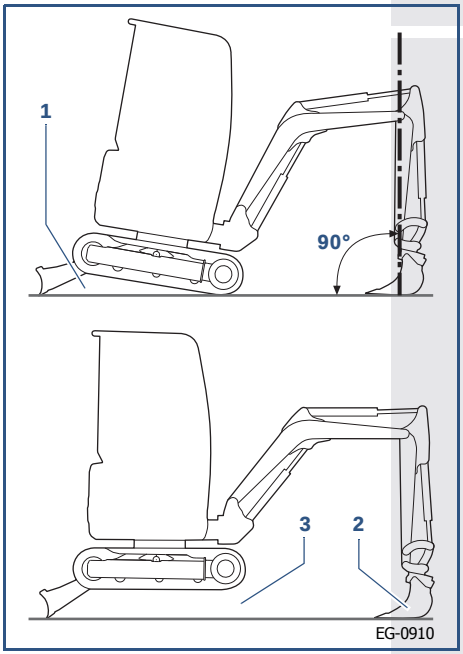
Periodically (every 50 hours) check for loose bolts on the drive gear, track tensioner and track rollers.



EG-1210

9.11.13 Track service position

To carry out a number of maintenance procedures on the undercarriage, the tracks first have to be raised off the ground, allowing access and making some space available. To raise the vehicle into the track servicing position, proceed as follows:



1 - With the vehicle on a hard, flat surface, turn the upper part of the structure through 180° so that the dozer blade is behind the operator.

2 - Bring the boom to the central position in front of the operator.

3 - Lower the dozer blade to the ground and keep pressing the control until the end of the vehicle is lifted off the ground (**1**).

4 - Position the dipper stick so that the boom cylinder is at right angles (90°) to the ground.

5 - Lower the excavator boom to bring the bucket to the ground (**2**).

6 - Apply downward pressure on the digging boom, and simultaneously extend the dipper stick as required, so that the front of the vehicle rises off the ground (**3**).

7 - Switch off the engine. Raise the servo-control cut-out lever to disengage the servo-control cut-out and exit the vehicle.

8 - Before starting maintenance or servicing procedures with the vehide in this position, it must be blocked in a safe condition. Place suitable jacks capable of supporting the entire weight of the vehicle on the ground under the machine, one under each corner of the undercarriage.

9 - Once all track maintenance operations are complete, repeat the steps of the described procedure in reverse order to lower the vehicle from the track maintenance position.

9.11.14 Checkin the track tension

If one or both of the tracks is not properly tensioned the following problems may occur:

- Uneven tension will make it difficult for the vehicle to travel in a straight direction, either forwards or in reverse.
- High tension will result in increased pressure on the idler and drive sprocket bearings, causing vibration and leading to premature failure of the tracks.
- Low tension may cause the track to slip off the front idler.
- Tension may be affected by a build-up of mud, sand or other debris in the track treads. Ensure that the treads are free of any foreign bodies before checking track tension.

Track tension is measured as follows:

1 - Park the vehicle on a hard, level surface.

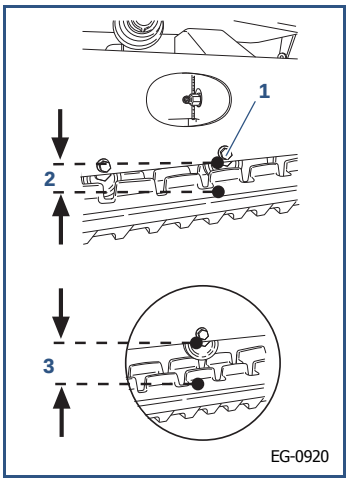
2 - Determine a reference point near the centre of each track frame (**1**), then measure the distance between each reference point and the top of the corresponding track tread (**2**).

3 - Raise the vehicle into the track service position as described in point 9.11.13.

4 - Re-measure the distance from the same track frame reference points to the corresponding track treads (**3**).

5 - Subtract the smaller measurement from the larger (**2-3**) for each side.

The resulting number is used to gauge the actual track tension.



6 - If the result is between 20 and 25 mm for each side, then the tensions are correct.

The vehicle can be lowered from the Track Service Position and the remaining daily maintenance and services can be completed. If the tension for one or both sides is not correct, proceed to the next point in this manual entitled "Track Tension Adjustment"

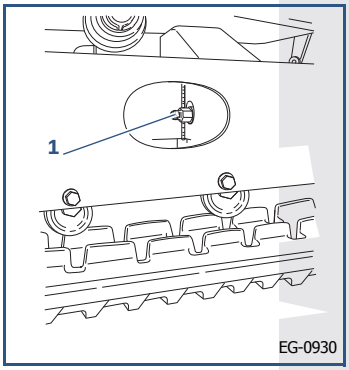
9.11.15 Adjusting the track tension

IMPORTANT

DO NOT attemp t to m ake any track tension adjustments until the following procedures have been read and clearly understood.
If any d oubts remain after having read the material, contact your EUROCOMACH Service Centre immediately for additional information.

Each trac k can be a ccurately tensioned by a djusting the grease loading of a hydraulic cylinder that applies tension on the track idler assembly.

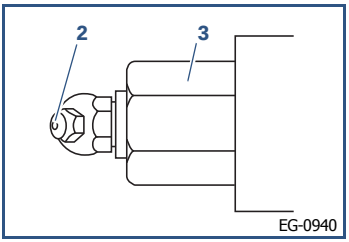
Adjustments to either the left or the right cylinders are made on the individual va lve assemblies (**1**) that are accessed through a central hole in the respective track frame.



WARNING

DO NOT remove the grease fitting (3) on the end of the valve, or attempt to turn the valve body (2) by hand. Grease may be expelled under extreme pressure and may penetrate the skin, causing serious injury. Wear suitable protective clothing and proper face protection before servicing either track adjuster.

To increase track tension



1 - Add a small amount of grease to the fitting on the end of the valve (**2**).

2 - Turn the track through 2 complete revolutions and check the tension.

3 - If the tension is between 10 and 15 mm, the adjustment is completed.

4 - Repeat this procedure as required until the correct tension is achieved.

To release tension from a track assembly:

1 - Using a 22 mm spanner, turn the body of the valve (**2**) slowly counter clockwise 1 to 1 turns, gradually exposing the pilot hole.

Release a small amount of grease, and then close the valve.

2 - Turn the track through 2 complete revolutions and check the tension.

3 - If the tension is between 10 and 15 mm, the adjustment is completed.

4 - Repeat this procedure as required until the correct tension is achieved.

5 - Tighten the valve (**2**) and torque to 88 Nm to complete the adjustment.

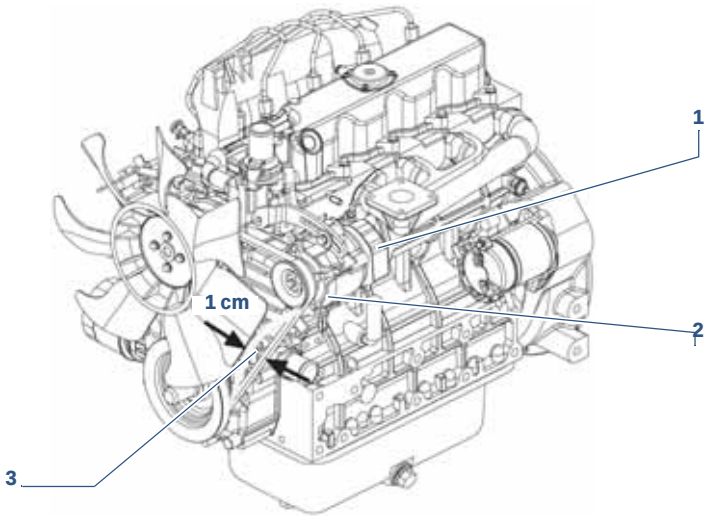
6 - All the instructions for adjusting track tension are the same forboth the rubber tracks and the optional steel tracks.

9.11.16 Checking the alternator belt

To check the tension of the bel t, press the lower section of the belt with your thumb (between the engine flange and the alternator).

If the belt flexes more than 1 cm, tension it:

- loosen the upper (**1**) and lower (**2**) alternator holding bolts,
- push the alternator outwards until the belt is correctly tensioned, then tighten the fixing bolts,
- re-check the tension of the belt (**3**).



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9.11.17 Checking the battery fluid level

DANGER

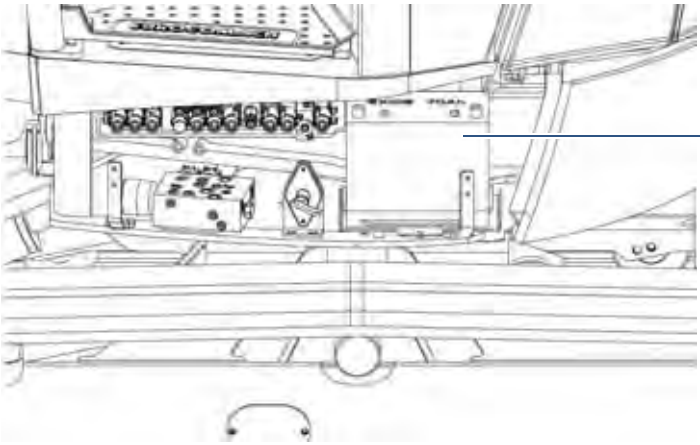
Check the level of the battery with the engine switched off. The electrolyte liquid is dangerous, if it gets into your eyes or on your skin, wash immediately under running water. If possible, wear waterproof gloves and goggles

WARNING

Keep the battery well charged; if the machine has been out of commission for a long time, charge the battery before use.
Never allow the battery to go completely flat.
Take the ignition key out before disconnecting the battery.

The battery is housed inside the left side panel (**1**):

- the fluid level in each element must be roughly 5 mm above the edge of the plates.
- top up the level using distilled water **ONLY.**



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9.11.18 Checking the air filter

CAUTION

Dismantle the filter with the engine stopped.
Do not start the engine with the air filter open or not fully assembled.

IMPORTANT

Only open the air filter housing for scheduled maintenance or when required because the air filter indicator light is lit. Excessive opening to check or clean an element increases the possibility of premature element failure, allowing dirt to enter and damage the engine.

WARNING

To avoid the possibility of severe burns, allow sufficient time for the engine to cool before any inspection, maintenance or service is performed on the exhaust or intake system.

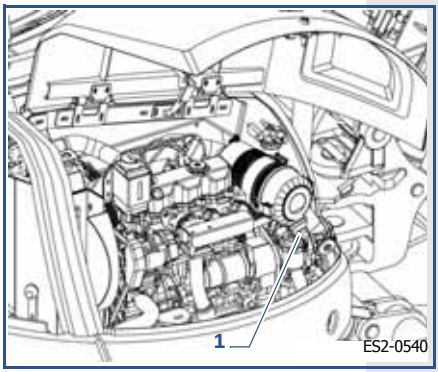
Inspect the intake hoses, air filter housing, muffler, exhaust and spark arrester (if fitted) for any signs of cracked pipes, loose or missing clamps, corrosion or holes. Tighten or replace parts as necessary to prevent intake and exhaust system leakage.

The air filter is accessed by removing the engine cover.

To check the air filter element, proceed as follows:

1 - Remove dust from the breather valve (**1**) by squeezing both sides, opening the valve and allowing loose particles to fall out.

2 - Turn the ignition key switch to the "RUN" position and check the air filter indicator light on the dashboard. If the light is ON, the filter must be replaced or cleaned.



IMPORTANT

All air cleaner manufacturers agree that attempting to clean or wash an element increases the chances of damaging that element. It is highly recommended that you consider the advantages of cleaning an element as against the risks of the operation, which may result in engine damage. Adopt the policy that all elements should be replaced with new ones rather than cleaning them.

Careful cleaning or washing, if carried out correctly, can extend the life of an element. However, you must realize that each time an element is cleaned the dirt holding capacity is reduced and the risk of dirt reaching the clean side of the filter is increased. Filters should never be washed more than six times, or kept in service for more than one year, whichever comes first.

To clean the air filter element, proceed as follows:

1 - Open the engine cover.

2 - Open the lid (**2**) retaining clips (**1**) and remove it from the fixed side (**3**).

3 - Take out the filter cartridge (**4**) and the safety cartridge (**5**), pulling horizontally.

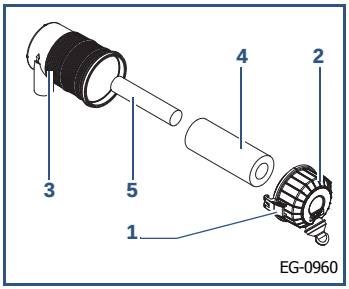
4 - Check the cartridges for any breakages or tears. Do not clean or reuse damaged elements but replace them with new parts.

5 - Clean the cartridges with a jet of clean, dry compressed air, blowing from the inside out.

6 - Always clean the inner surface of the fixed part (**3**). Any dust present could prevent an airtight seal and cause leakage. Make sure that all impurities are removed before fitting the new or cleaned element.

7 - Fit the new elements with the open side facing inwards. To achieve an airtight seal, apply pressure to the outside edge rather than to the centre.

8 - Put the filter lid (**2**) in place and fix with the clips (**1**).



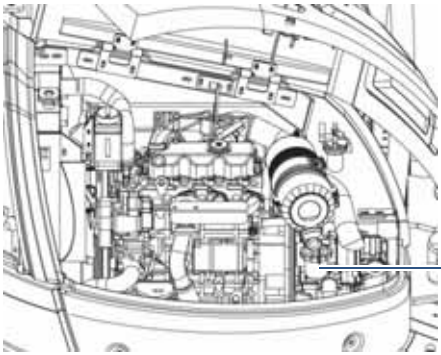
9.11.19 Changing the fuel filter

DANGER

Change the fuel filter with the engine cold.
If you spill fuel during this operation, clean up the spill to avoid any risk of fire.

The fuel filter (**1**) is housed in the engine compartment.
To change it proceed as follows:

- Unscrew the filter and dispose of it in compliance with the applicable laws;
- clean the surrounding area in order to prevent any debris from getting into the circuit;
- moisten the seal of the new filter with machine oil;
- introduce the filter to the base and screw it on manually until tight;
- bleed out the air as indicated in point 9.11.22.
- after starting the engine, check to ensure that there are no leaks.



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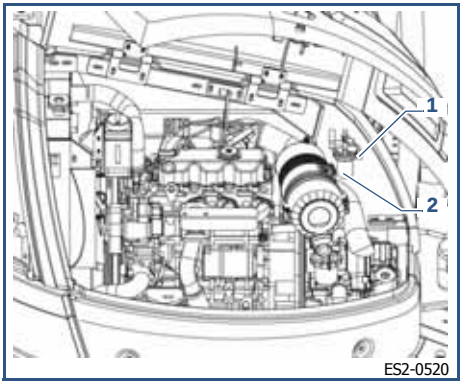
9.11.20 Draining water from the Diesel circuit

A separator filter collects any condensation formed in the diesel tank so as to prevent it being pumped to the engine together with the fuel.

- The separator filter has a built-in electric sensor that makes a light on the dashboard come on in the presence of water, which must then be drained.

The water separation filter (1) is located inside the engine compartment and can be accessed by opening the engine cover.



In order to drain the water:

- close the tap (**1**) located on the separator itself;
- unscrew the cup (**2**), pour out the liquid contents and clean thoroughly;
- screw the unit back on and tighten hard;
- open the tap (**1**);
- bleed out the air as indicated in point 9.11.22.

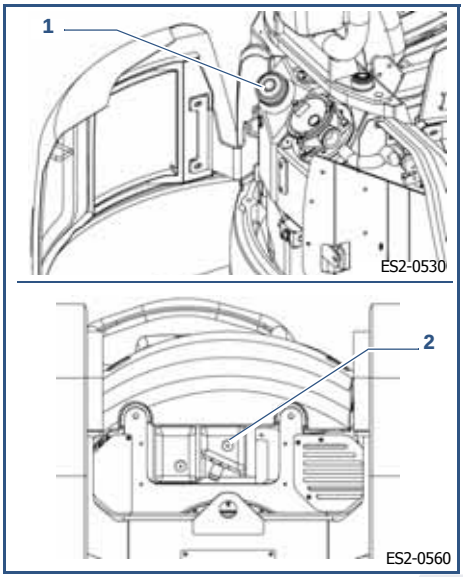
After starting the engine, check to ensure that there are no leaks.

9.11.21 Draining the fuel tank

To empty the tank of any accumulated dirt or condensation:

- remove the filler cap (**1**);
- unscrew the drain plug (**2**), under the tank;
- drain the fuel into a suitable container, and dispose of it in compliance with the regulations currently in force;
- clean the cap (**2**) with a cloth and screw it back on;
- fill up with fuel;
- replace the cap on the fuel filler spout (**1**);
- bleed out the air as indicated in point 9.11.22;

After starting the engine, check to ensure that there are no leaks.



9.11.22 Bleeding air from the feeder circuit

After having cleaned out the water separator and/or the fuel filter, or having replaced a filter car tridge or c arried out any maintenance on the syste m, bleed the system in accordance with the applicable procedure:

1 - fill the fuel tank completely;

2 - open the water separator tap;

3 - Turn the ignition switch to "RUN: in this way, any air in the system will be pur ged automatically via the electrolyte pump.

⚠ WARNING

Wait for 1 minute and then attempt to start the engine. If the engine does not start, wait another minute, with the ignition set to "RUN", then retry.

9.11.23 Checking the oil in the travel gear motors

CAUTION

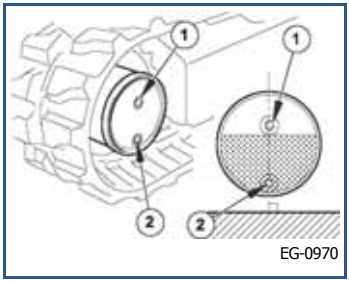
Remember that the side travel gearboxes and their oil can become extremely hot while working and so it is essential when carrying out this operation with the machine still hot to protect all parts of the body with adequate clothing, goggles and safety equipment, because there is the risk of burns and personal injury.
Undo the screw caps slowly to inspect the level of oil in the gearboxes.
This is so that the pressure built up inside the gearboxes can be let out gradually.
When changing the oil, do not stand in a direct line with the side of the gearbox and always wear safety goggles.
Aligning the plugs for filler and level plugs on the side travel gearboxes, described below, should be carried out with an assistant on the ground. The assistant must however remain strictly outside the working range of the machine.
Never inspect or carry out maintenance on the travel motor circuits while on a slope.
They are highly pressurised due to the weight of the machine.

Park the machine on a firm, level surface. The side gearbox must be orientated in such a way that the plugs (**1**) and (**2**) are aligned vertically as shown here.

This position is essential for correct maintenance to be carried out.

After positioning the gear box for draining or refilling with oil, set out the machine controls in the following way:

- Rest the bucket on the ground;
- move the throttle lever to the idling position, turn off the engine, take out the ignition key and raise the safety lever to the STOP position.



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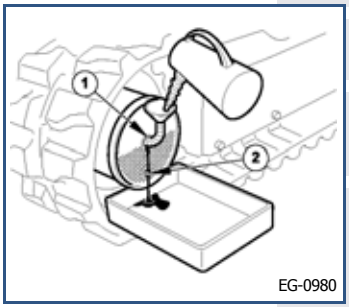
To check the level:

- Position the gearbox as shown above;
- unscrew the plug (**1**), if the oil level is not up to the hole, top up with the grade of oil stated in the relevant section until it comes out of the hole. Oil spilling out the hole means the correct level has been reached;
- refit the plug (**1**).

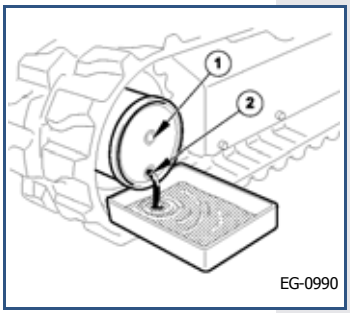


The operations described above must be carried out on both side travel gearboxes.

9.11.24 Changing the oil in the travel gear motors

Position the gearbox as shown:

- slowly undo the screwplug (**1**), to allow the pressure in the gearbox to escape gradually. Once the pressure has been released, remove the plug completely(**1**) from its seat.
- unscrew the plug (**2**) and remove it from its seat.
- leave the oil to drain out into a suitable container.
- screw in the plug (**2**)
- follow the instructions in the previous point to restore the oil level.



9.11.25 Swivel gear motor

The swivel gear motor is lubricated internally by the same hydraulic fluid as the machine system. This motor therefore requires no maintenance.

9.11.26 Lubrication

IMPORTANT

Clean the grease nipples before attaching the grease gun.

Clean off any excess dirty grease after lubrication.

If you use the machine under critical operating conditions, carry out this maintenance task more frequently.

As a general rule it is well to remember that each cylinder has two grease nipples located on the connecting hitch and that each pin that acts as a pivot for movement has at least one nipple.

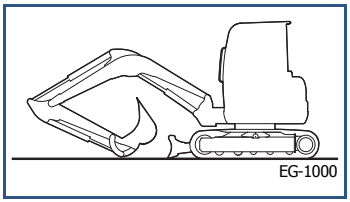
While running in a new machine, lubricate every 10 hours for the first 100 hours of operation.

After digging with the equipment immersed in water, always lubricate the pins that have been in contact with the water.

1 - For lubrication position the machine as shown in the figure; lower the working equipment to the ground, then stop the engine;

2 - the grease nipples are located as shown below;

3 - after lubrication remove all traces of excess grease.



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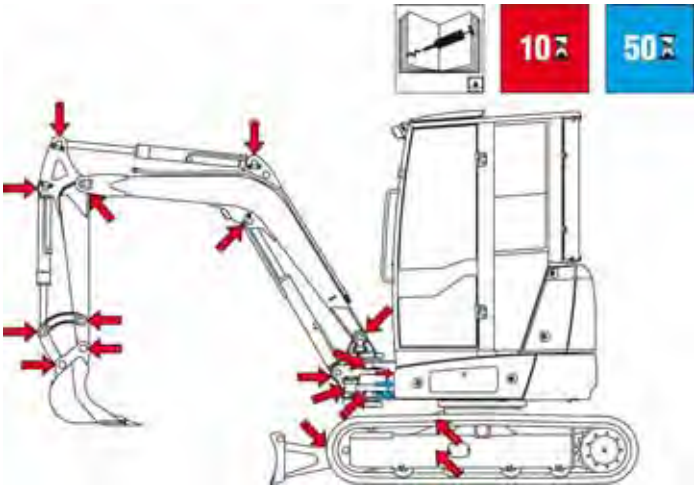
LUBRICATION ON VERSION ES850ZT



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9.12 Long periods of inactivity

If long periods of inactivity are expected, the vehicle should be parked under cover in order to keep the vehicle and its parts in good condition, taking the following precautions:

- park the vehicle on a level surface. (e.g.: a solid base);
- inspect the vehicle. Repair any damaged or worn parts. Replace with new parts where necessary;
- carry out a complete and thorough cleaning;
- park the vehicle in a dry, sheltered area. If the vehicle is parked out in the open, choose a level area and cover it with a waterproof tarpaulin in such a way that ventilation is allowed. Otherwise it would favour the formation of condensation, which is bad for the vehicle;
- drain and change the engine oil and hydraulic circuit fluid, following the instructions specified in point 9.11.2 and point 9.11.9 and being sure to change the filters;
- check and clean the air filter; if you have any doubts about its efficiency, replace it;
- fill the fuel tank completely so as to prevent the formation of condensation;
- remove the battery, check the electrolyte level and make sure the battery is charged;
- store the battery in a dry sheltered spot and recharge it regularly. If the batteries are not being removed, detach the negative (-) battery cable from the terminal.

CAUTION

Batteries generate explosive gases whilst being charged. Do not allow any naked flames or produce any sparks in the vicinity of the charging area. avoid making any improper connections: Never connect a positive (+) cable to a negative (-) terminal. Remove all of the battery cell caps when recharging the battery.

- Draining the coolant from the radiator. Drainage is not essential if the system is filled with an anti-freeze mixture;
- place a warning sign on the controls, stating that there are no liquids in the vehicle;
- loosen the fan belt from the alternator and the fan;
- preferably retract all of the cylinders. Otherwise, cover any exposed portions of the cylinder rods in grease;
- grease the hydraulic cylinder rods and all the equipment joints;
- lubricate all of the lubrication points;

- Dismantle the injectors and inject engine oil through the injector openings (This must be done using a syringe after having moved the piston to bottom dead centre);
- after having injected the engine oil and using the starter motor, force the thermal motor to turn over a few times in order to lay down a protective layer of oil on the linings;
- refit the injectors;
- it is advisable to allow an authorised workshop to carry out this operation;
- cover the open end of the exhaust pipe;
- paint all vulnerable parts to prevent any rust formation. While the vehicle is in storage, start the engine once a month and activate the travelling, swivelling and digging hydraulics 2-3 times so that a new layer of oil covers all moving parts and component surfaces. Recharge the battery at the same time. When activating the working equipment, remove all the grease from the hydraulic cylinder rods. Check the coolant level (to be re-filled if it had previously been drained) and the lubrication status before commissioning the vehicle.

After a long period of inactivity prepare the vehicle for use as follows:

- remove the grease from the hydraulic cylinder rods;
- adjust the tension of the fan and alternator belts;
- fill the radiator with coolant;
- fill up the fuel tank;
- check all fluid levels (lubricants and hydraulic systems);
- install the battery and make sure it is fully charged;
- change the fuel filter and bleed any air out of the fuel lines, see point 9.11.22;
- when a vehicle stands idle for a long period, the humidity in the air can get into the oil. Ensure that there is no water in the oil, both before and after starting the engine. If any water is found, change the oil;
- take the cover off the end of the exhaust pipe, start the engine and let it idle free for about 20 minutes;
- before moving the vehicle, check that the instruments, indicator lights and work lights are functioning properly;
- run all hydraulic functions through a number of full cycles;
- carefully check all systems prior to operating the vehicle at full capacity.

IMPORTANT

Following any long periods of vehicle inactivity, carry out all of the above operations and the following checks:

a - *Check the condition of all hoses and connections.*

b - *Warm up the engine.*

c - *Switch off the engine.*

d - *Fit new fuel filters. Change the oil filter and fill up with engine oil.*

IMPORTANT

When the vehicle has been standing for long periods, the film of oil on the sliding surfaces may have deteriorated. Run the travelling, swivelling and digging hydraulics through 2 or 3 full cycles in order to lubricate the sliding surfaces.

9.13 Long-term storage

If you deicide to put this vehicle out of service permanently, it is recommended that it be disabled by removing the battery, emptying the fuel tank and removing the ignition key.

If the vehicle is to be scrapped, dismantle it into its component parts, remembering not to discard pollutant products into the environment (battery, engine oil, hydraulic oil and relative filters), but rather to deliver them to specialised waste disposal centres for disposal in accordance with the laws in force.

⚠ CAUTION

The disposal of the vehicle must be undertaken exclusively by suitably trained and qualified personnel authorised to carry out this operation.

Commence with the dismantling of components only once these, as well as the hydraulic fluids and lubricants, are completely cool and after the any residual pressure has been vented.

Prior to commencing with any dismantling operations, first drain all vehicle components, tanks and systems of all fluids in accordance with GENERAL SAFETY STANDARDS.

Certain specific tools are required for dismantling the vehicle (chain-blocks, hydraulic presses, containers for fluids, etc.) As well as some special equipment. This is in order to avoid any risk of injury to the workers or damage to the environment during such dismantling operations.

The vehicle contains the following:

- pressurised fluids (hydraulic system, cooling system, etc.);
- gases (air-conditioning system and battery, where fitted);
- acid (battery);
- very heavy vehicle components (booms, buckets, etc.).

Handle and dispose of fluids in compliance with local current regulations. Only authorized disposal procedures must be followed, contact the authorities in charge in case of any doubt.

10.0 Hydraulic and electrical circuit diagrams

10.1 Hydraulic control valve

BUCKET

MAIN BOOM

LEFT TRAVEL

RIGHT TRAVEL

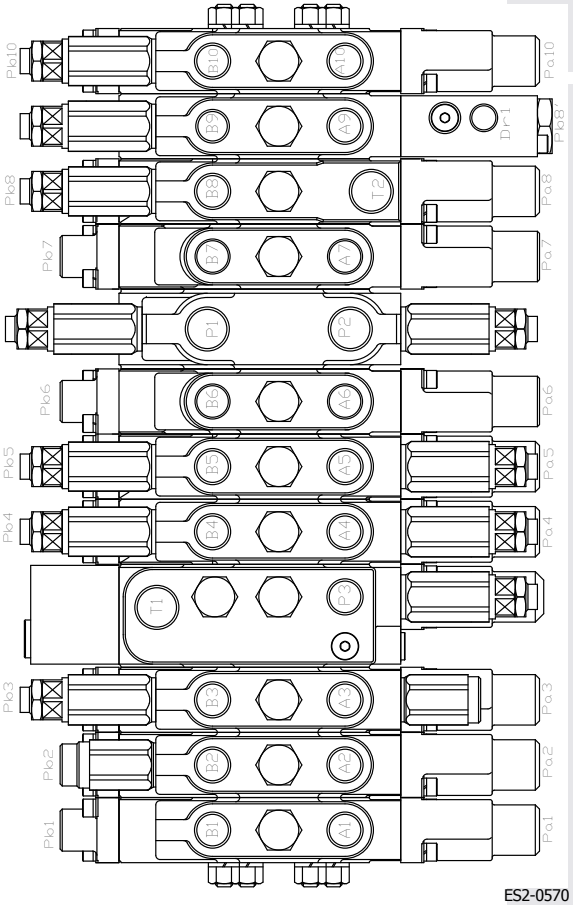
DIPPER STICK

AUXILIARY CIRCUIT

DOZER

BOOM SWING

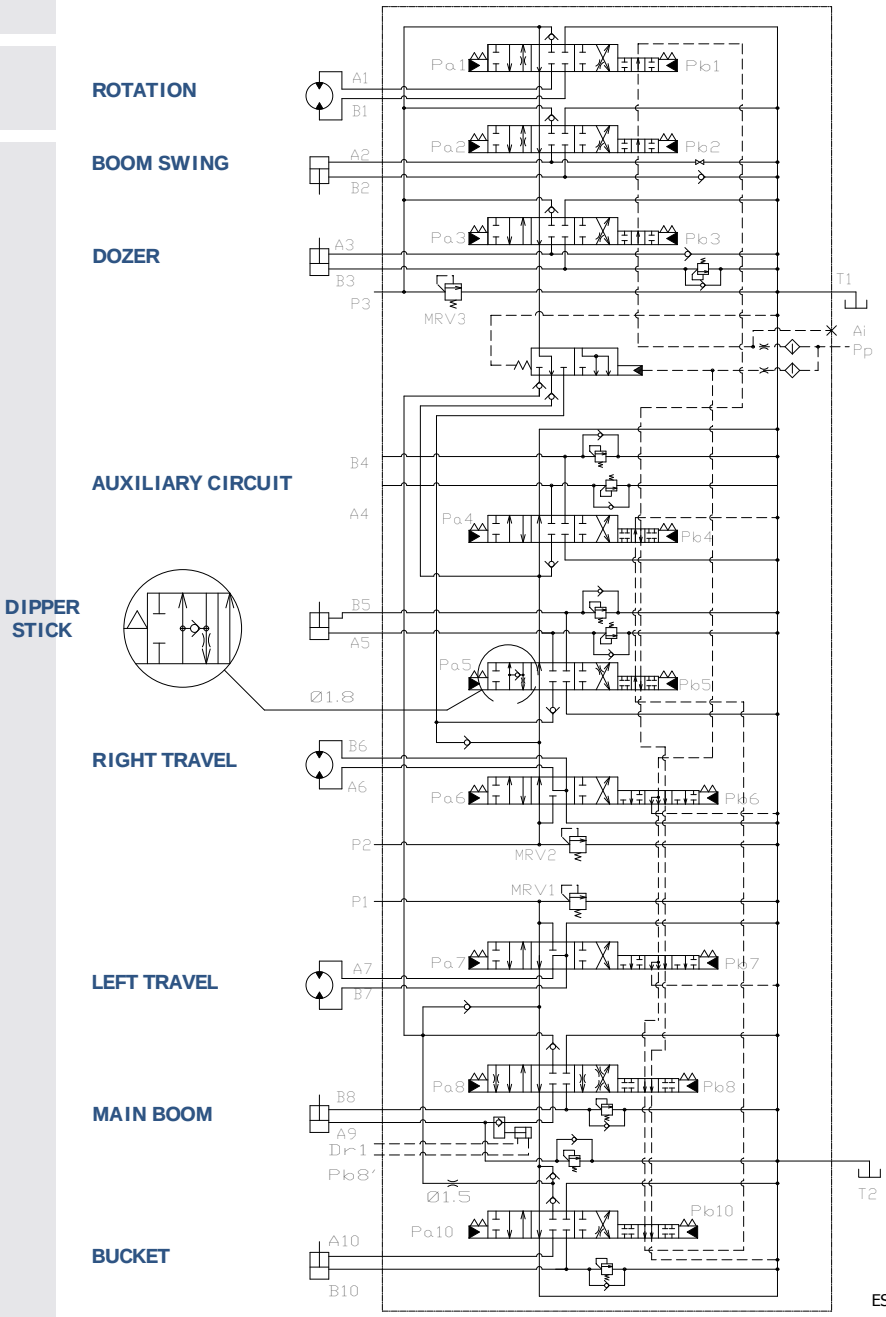
ROTATION



ES2-0570

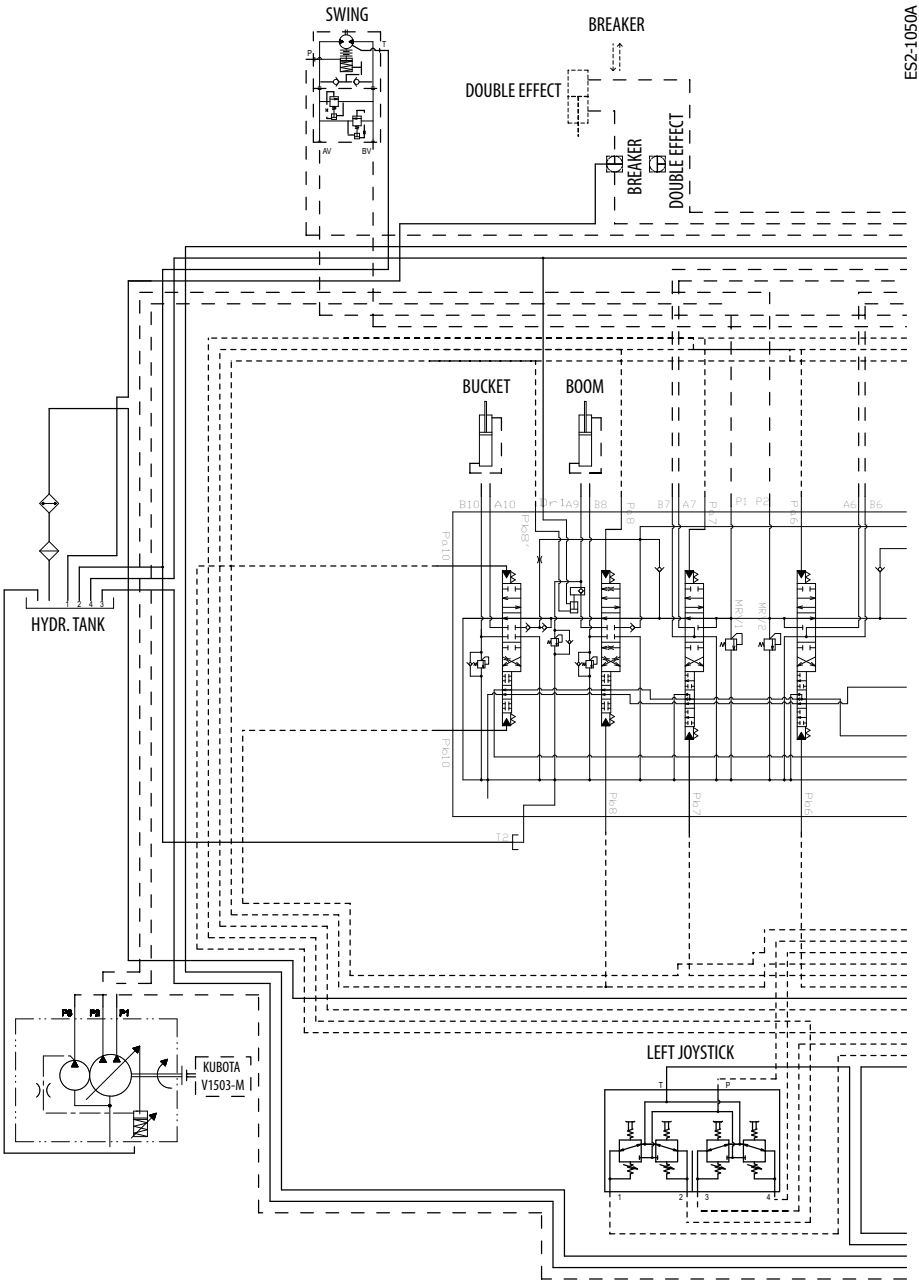
OIL TYPE:	ISO 46
OIL TEMPERATURE:	-20°C; +90°C
PUMP FLOW RATES:	P1= 37 l/min P2= 37 l/min P2= 28 l/min
OPERATING PRESSURE:	P1= 230 bar P2= 230 bar P2= 210 bar
BUFFER VALVE TEMPERATURE:	
MAIN BOOM, BUCKET, DIPPER STICK, AUXILIARY CIRCUIT, DOZER BLADE	280 $^{+5}_{-5}$ bar
CONNECTION TO CYLINDERS:	
BASE: A2; A5; A9; B10	
ROD: B2; B5; B8; A10	

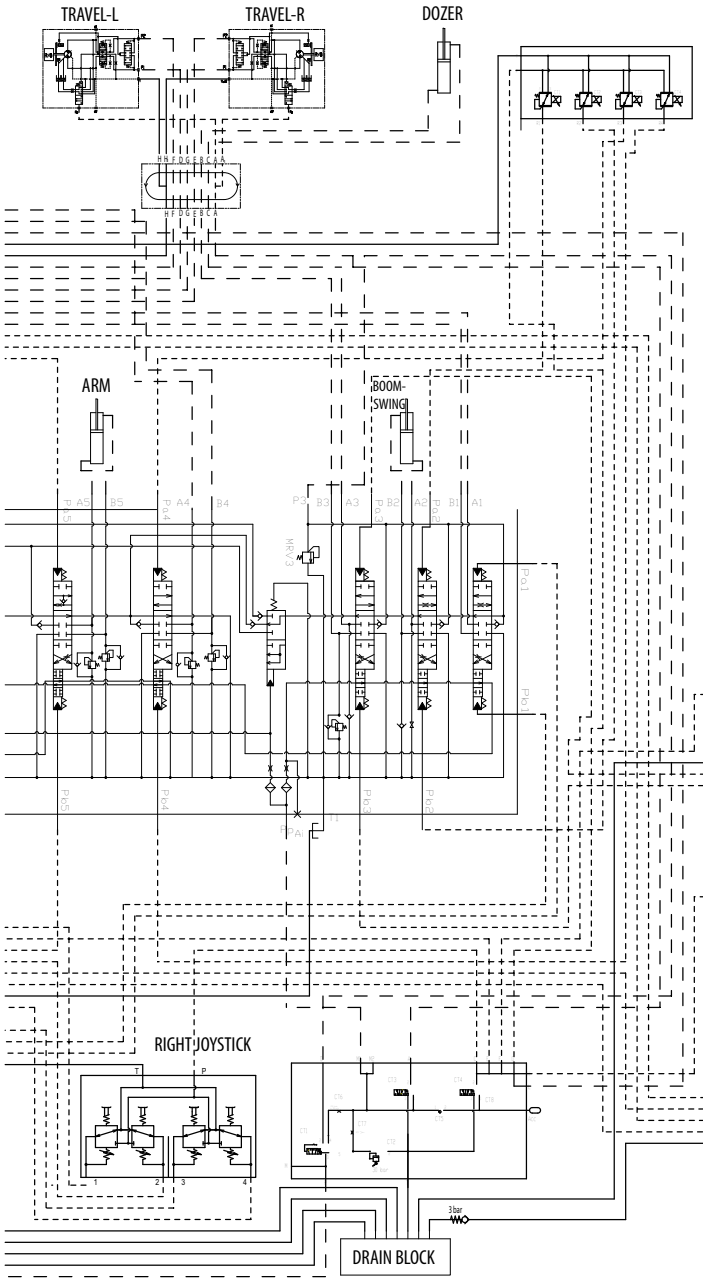
10.2 Hydraulic control valve wiring diagram



10.3 Hydraulic system layout

10.3.1 Model ES28ZT - ES35ZT

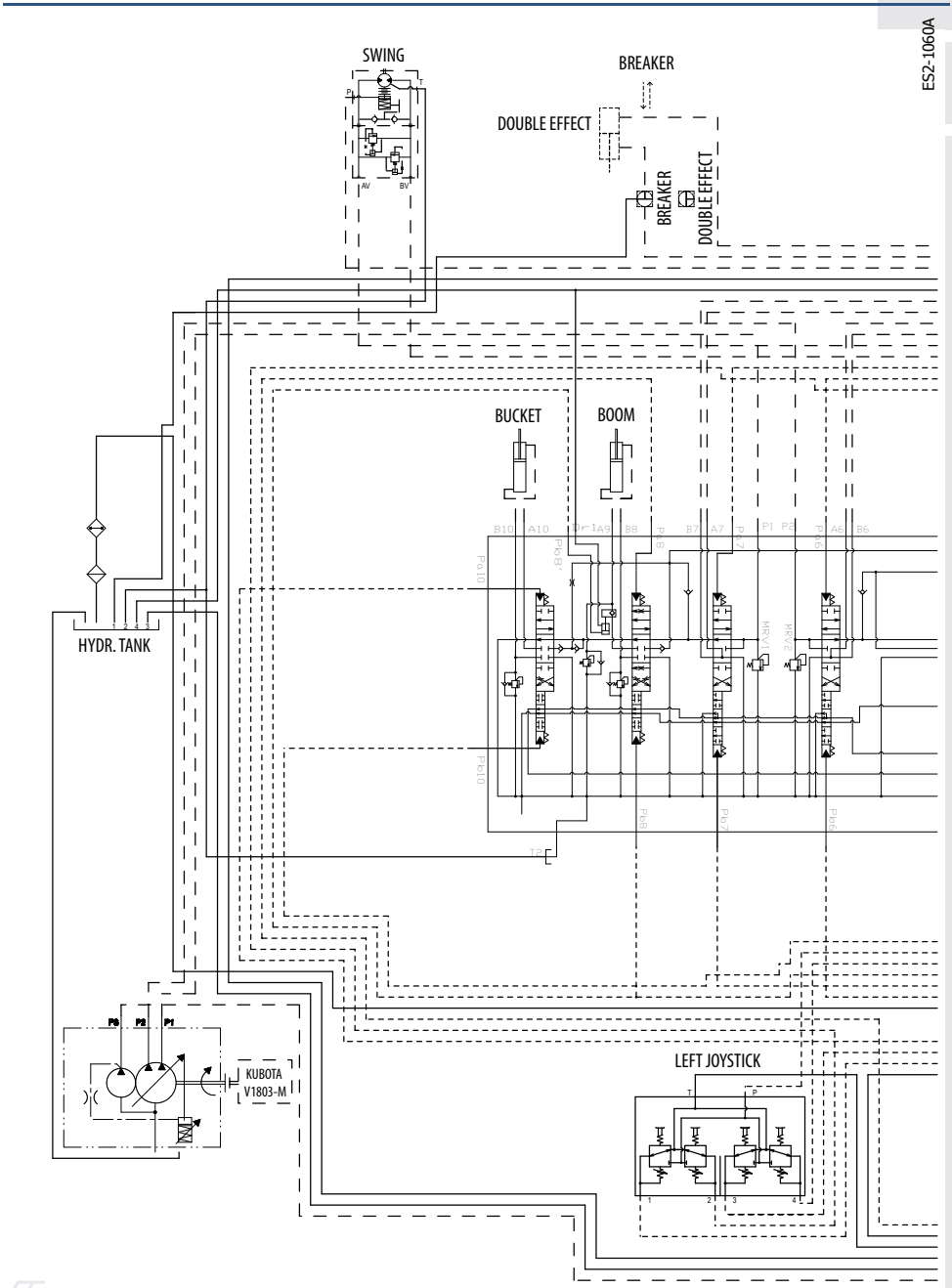


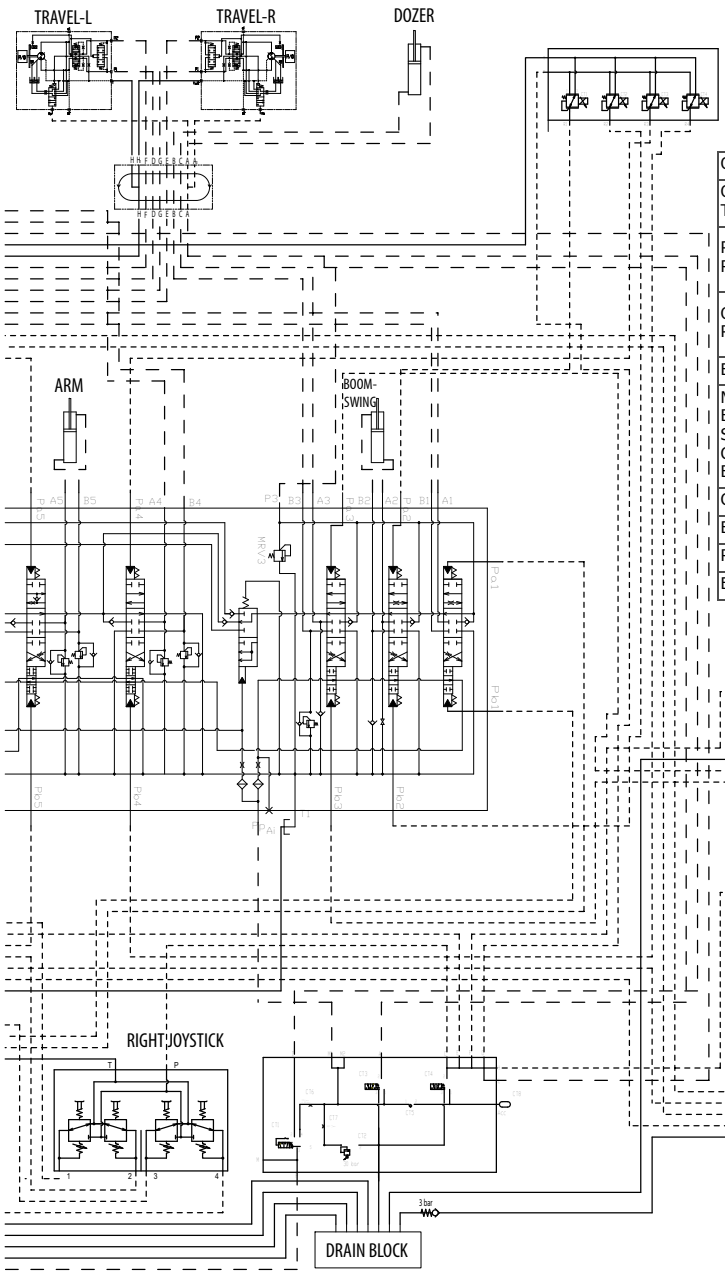


OIL TYPE:	ISO 46
OIL TEMPERATURE:	-20°C; +90°C
PUMP FLOW RATES:	P1= 37 l/min P2= 37 l/min P3= 28 L/min
OPERATING PRESSURE:	P1= 230 bar P2= 230 bar P3= 210 bar
BUFFER VALVE TEMPERATURE:	
MAIN BOOM, BUCKET, DIPPER STICK, AUXILIARY CIRCUIT, DOZER BLADE	280 $^{+5}/_{-5}$ bar
COLLEGAMENTO AI CILINDRI:	
BASE: A2; A5; A9; B10	
ROD: B2; B5; B8; A10	
ENGINE SPEED: 2200 rpm	

ES2-1050B

10.3.2 Model ES40ZT





OIL TYPE:	ISO 46
OIL TEMPERATURE:	-20°C; +90°C
PUMP FLOW RATES:	P1= 37 l/min P2= 37 l/min P3= 28 L/min
OPERATING PRESSURE:	P1= 230 bar P2= 230 bar P3= 210 bar
BUFFER VALVE TEMPERATURE:	
MAIN BOOM, BUCKET, DIPPER STICK, AUXILIARY CIRCUIT, DOZER BLADE	280 $^{+5}/_{-5}$ bar
COLLEGAMENTO AI CILINDRI:	
BASE: A2; A5; A9; B10	
ROD: B2; B5; B8; A10	
ENGINE SPEED: 2200 rpm	

ES2-1050B

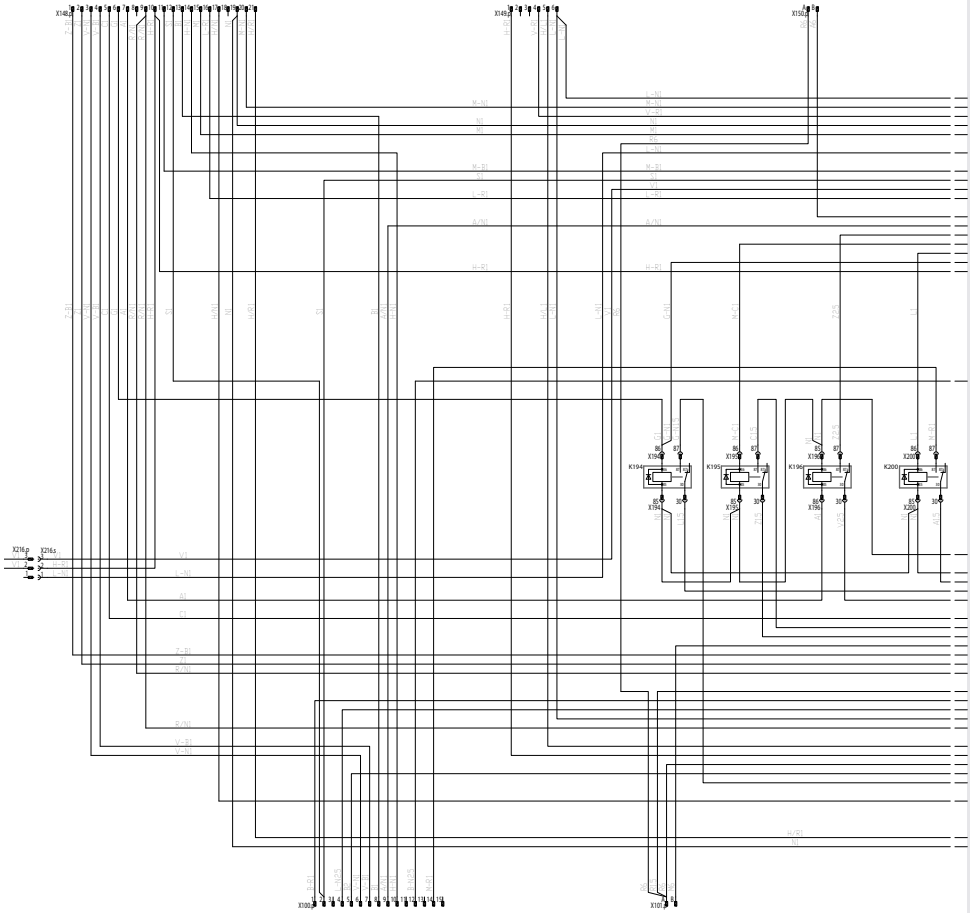
10.4 Electrical system

10.4.1 Diagram of control box line - 0A029204 REV05

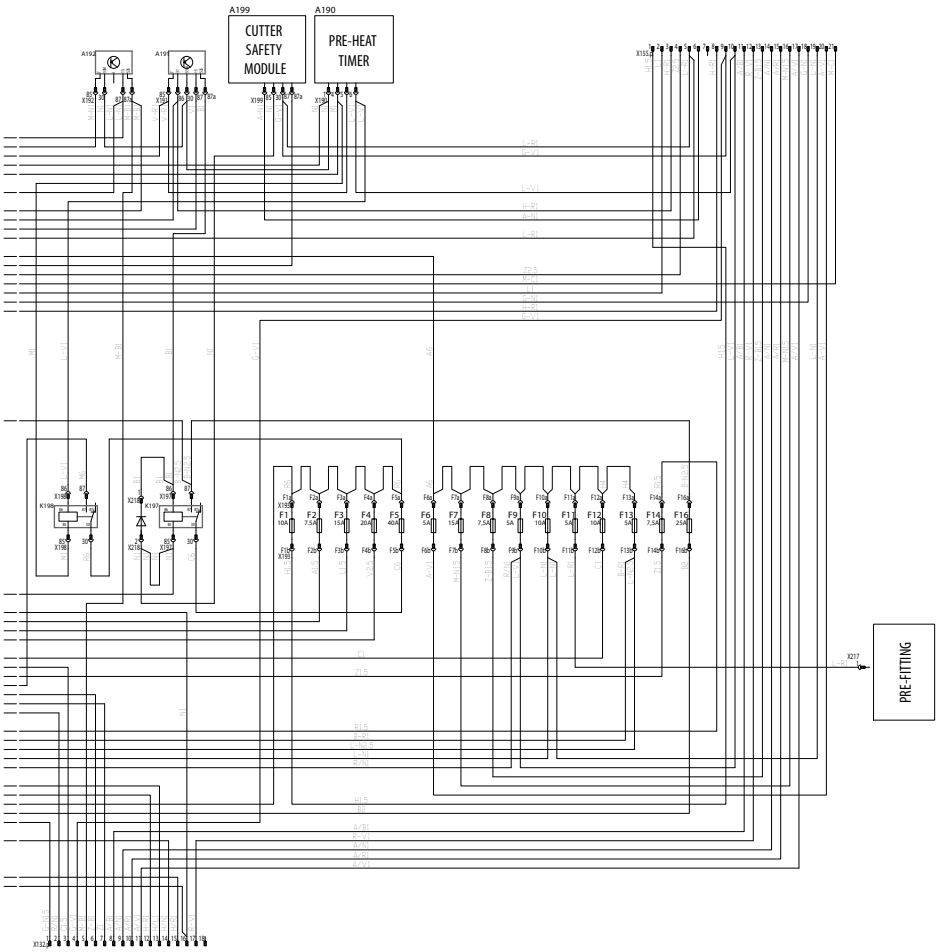
NAME	DESCRIPTION
A190	PRE-HEAT TIMER
A191	STARTER ANTI-REPETITION
A192	2nd SPEED MODULE
A199	CUTTER SAFETY MODULE
F1	CIGARETTE LIGHTER +30 FUSE
F2	AIR CONDITIONING FUSE
F3	WORK LIGHTS RELAY FUSE
F4	HEATING RELAY FUSE
F5	STARTER RELAY FUSE
F6	ROOF ROTATING LIGHT SWITCH FUSE
F7	OPTIONAL WORK LIGHTS FUSE
F8	WINDSHIELD WIPER +15 FUSE
F9	LIGHTS AND WARNING LIGHTS POWER FUSE
F10	SPEED CHANGE BUTTON AND ARMREST MICROSWITCH FUSE
F11	OPTIONAL FUSE
F12	AUTO IDLE KIT +15 FUSE
F13	ELECTRICAL BUFFER STOP HOLD AND +15 ALTERNATOR FUSE
F14	FUSE HORN RELAY

NAME	DESCRIPTION
F16	ELECTRICAL BUFFER STOP FUSE
K194	BOOM WORK LIGHTS RELAY
K195	HORN RELAY
K196	HEATING RELAY
K197	STARTER RELAY
K198	PRE-HEAT RELAY
K200	AIR CONDITIONING RELAY
X100.P	ENGINE LINE INTERFACE CONNECTOR
X101.P	INTERFACE CONNECTOR TO ENGINE LINE
X132.P	PEDALS INTERFACE CONNECTOR
X148.P	RH ARM REST INTERFACE CONNECTOR
X149.P	LH ARM REST INTERFACE CONNECTOR
X150.P	INTERFACE CONNECTOR TO RH ARM REST
X155.P	LH ARM REST INTERFACE CONNECTOR
X216.P	BRIDGE CONNECTOR
X216.S	STARTING MODE INTERFACE CONNECTOR
X217	PRE-FITTING CONNECTOR

WIRING COLOUR CODING LEGEND	
A	LIGHT LUE B
B	WHITE
C	ORANGE
G	YELLOW
H	GREY
L	DARK LUE B
M	BROWN
N	BLACK
R	RED
S	PINK
V	GREEN
Z	PURPLE
	A-B = LIGHT BLUE / WHITE LENGTHWISE
	A-B = LIGHT BLUE / WHITE CROSSWISE



ES2-1040A



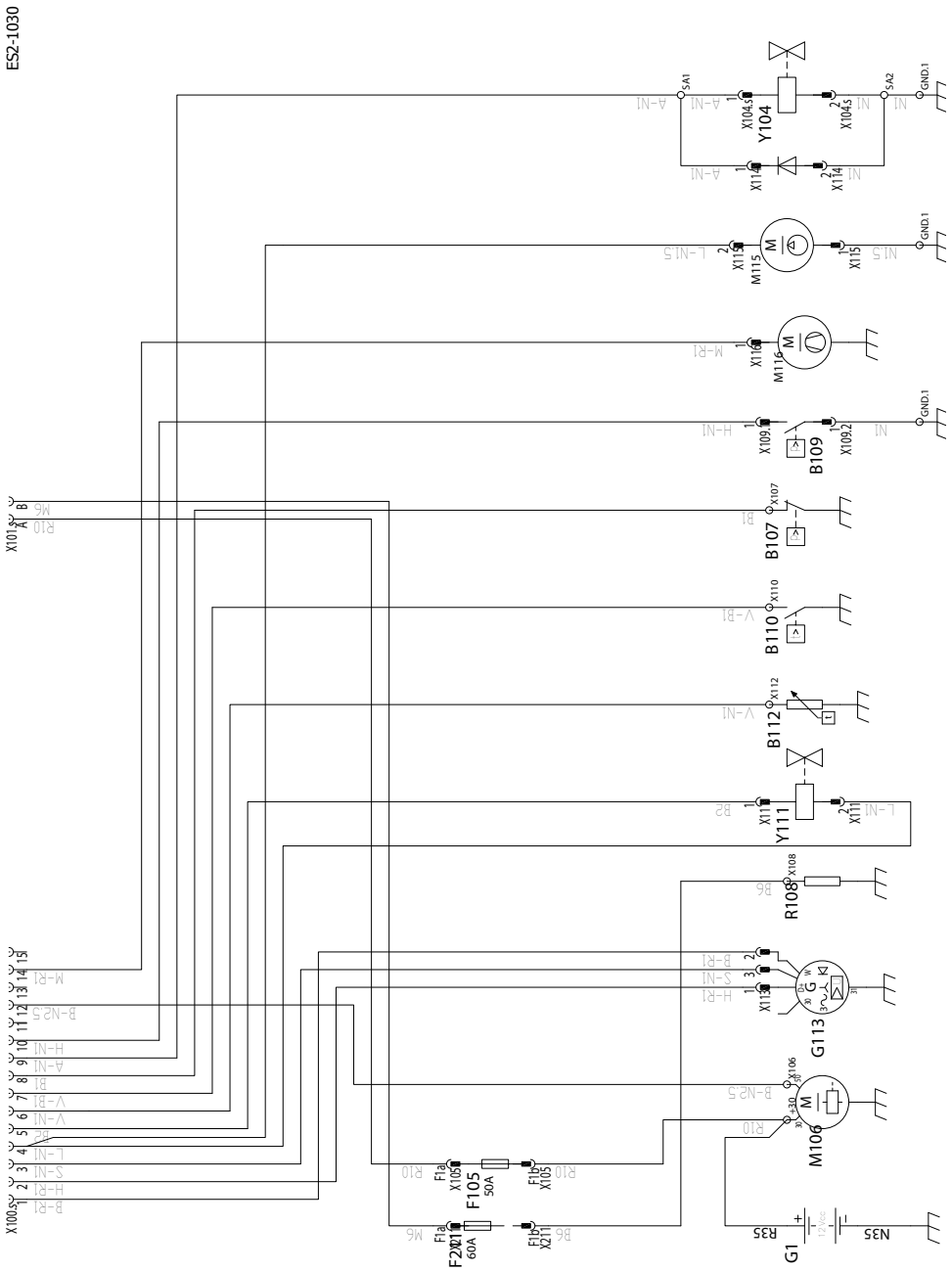
ES2-1040B

10.4.2 Engine line diagram - 0A029206 REV03

NAME	DESCRIPTION
B107	ENGINE OIL LOW PRESSURE INDICATOR LIGHT
B109	BLOCKED AIR FILTER PRESSURE SWITCH
B110	ENGINE WATER HIGH TEMPERATURE THERMOSTAT
B112	ENGINE H_2O TEMPERATURE SENSOR
F105	MAIN FUSE
F211	GLOW PLUGS FUSE
G1	BATTERY
G113	ALTERNATOR

NAME	DESCRIPTION
M106	STARTER MOTOR
M115	FUEL PUMP
M116	A/C COMPRESSOR
R108	GLOW PLUGS
Y104	OPTIONAL CUTTER SOLENOID
Y111	ENGINE CUT-OUT
X100.S	CONTROL BOX LINE INTERFACE CONNECTOR
x101.S	INTERFACE CONNECTOR TO CONTROL BOX LINE

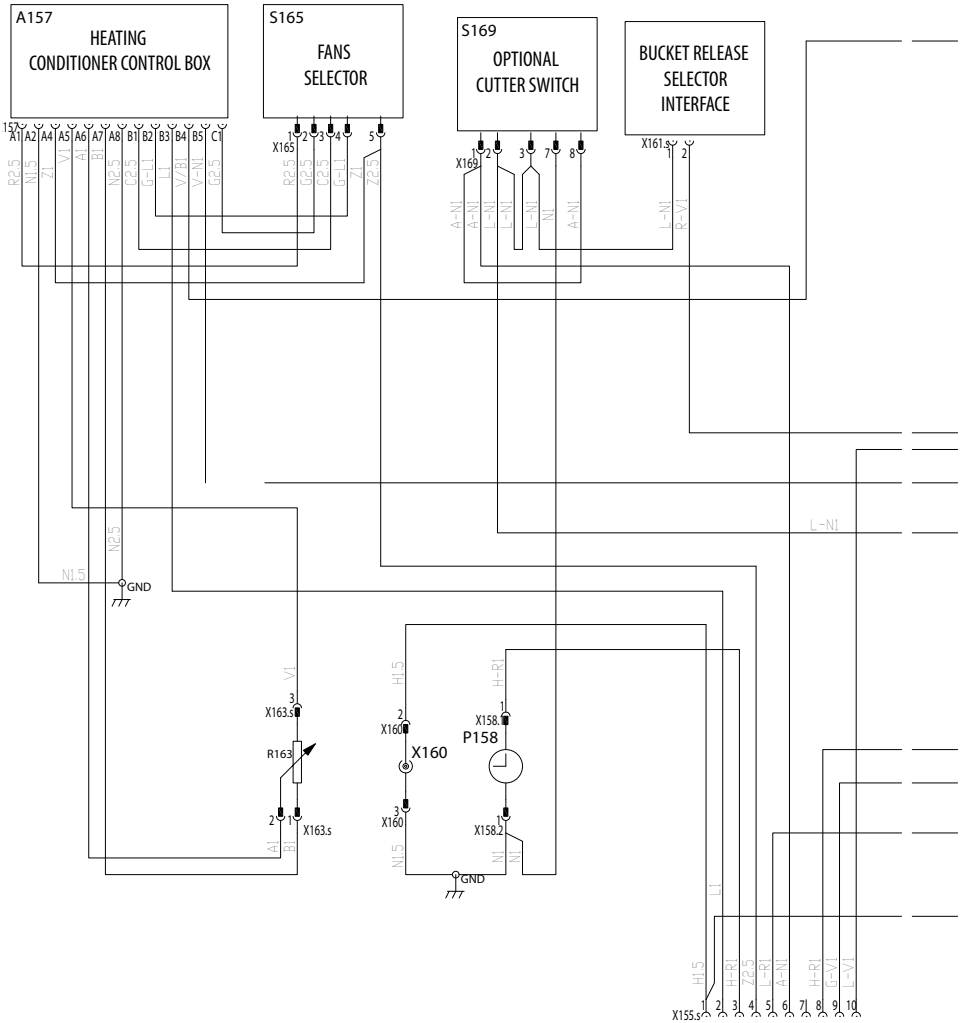
WIRING COLOUR CODING LEGEND	
A	LIGHT LUE B
B	WHITE
C	ORANGE
G	YELLOW
H	GREY
L	DARK LUE B
M	BROWN
N	BLACK
R	RED
S	PINK
V	GREEN
Z	PURPLE
	A-B = LIGHT BLUE / WHITE LENGTHWISE
	A-B = LIGHT BLUE / WHITE CROSSWISE

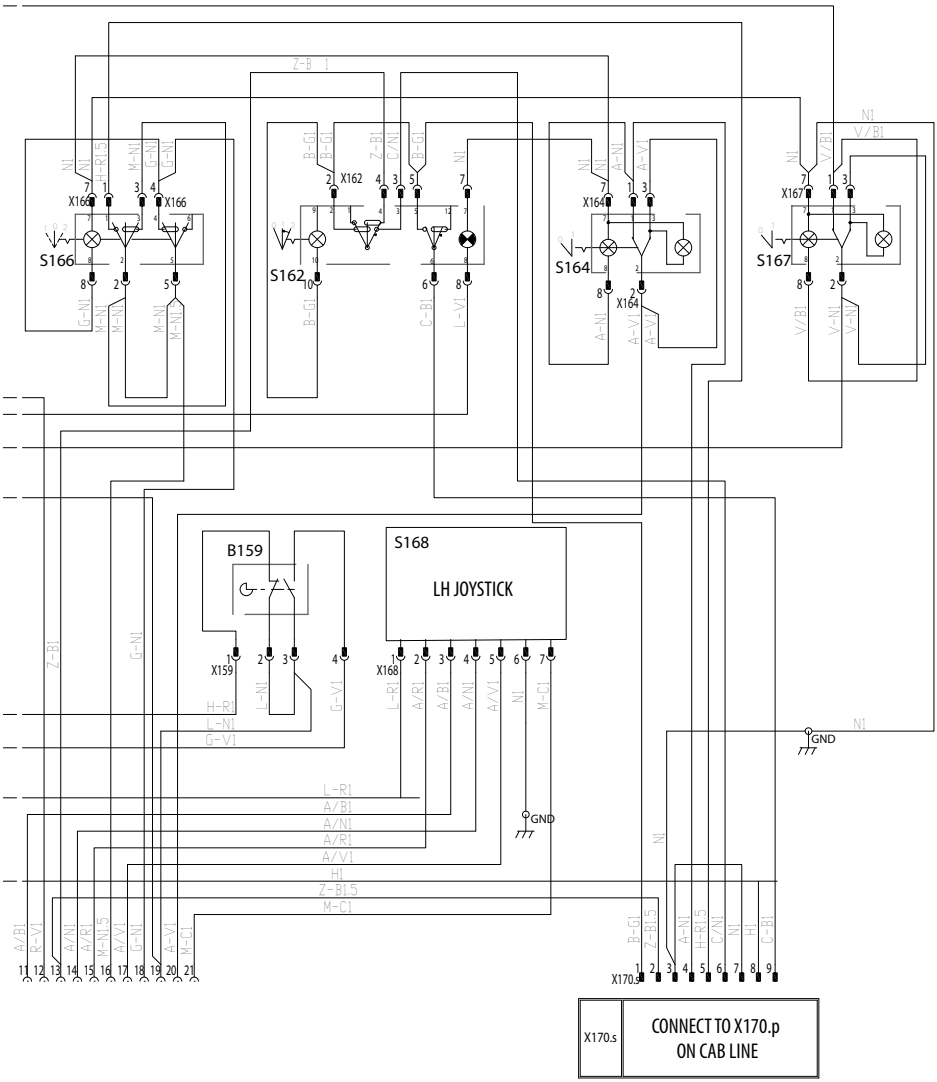

ES2-1030
Y104
B109
B107
B110
B112
Y111
R108
G113
M106
F105
50A
F2
60A
G1
N35
M115
M116

10.4.3 Right side dashboard line diagram - 0A029200 REV04

NAME	DESCRIPTION
B198	ALARM BUZZER
H135	DEACTIVATION LIGHT
H137	GENERATOR LIGHT
H138	ENGINE OIL LIGHT
H139	AIR FILTER LIGHT
H140	PRE-HEAT LIGHT
H153	2nd SPEED LIGHT
P141	FUEL LEVEL INSTRUMENT
P142	ENGINE WATER TEMPERATURE INSTRUMENT
R152	MANUAL ACCELERATOR
S146	RIGHT JOYSTICK
S147	STARTER PANEL
S151	AUTO-IDLE SWITCH
X148.S	CONTROL BOX LINE INTERFACE CONNECTOR
X149.S	INTERFACE CONNECTOR TO CONTROL BOX LINE.
X150.S	INTERFACE CONNECTOR TO CONTROL BOX LINE.
X210.S	AUTO IDLE KIT CONNECTOR

WIRING COLOUR CODING LEGEND	
A	LIGHT LUE B
B	WHITE
C	ORANGE
G	YELLOW
H	GREY
L	DARK LUE B
M	BROWN
N	BLACK
R	RED
S	PINK
V	GREEN
Z	PURPLE
	A-B = LIGHT BLUE / WHITE LENGTHWISE
	A-B = LIGHT BLUE / WHITE CROSSWISE


A157
HEATING
CONDITIONER CONTROL BOX
S165
FANS
SELECTOR
S169
OPTIONAL
CUTTER SWITCH
BUCKET RELEASE
SELECTOR
INTERFACE
X165
X169
X161.s
X163.s
R163
X160
P158
X158.1
X158.2
X155.s
GND
L-N1

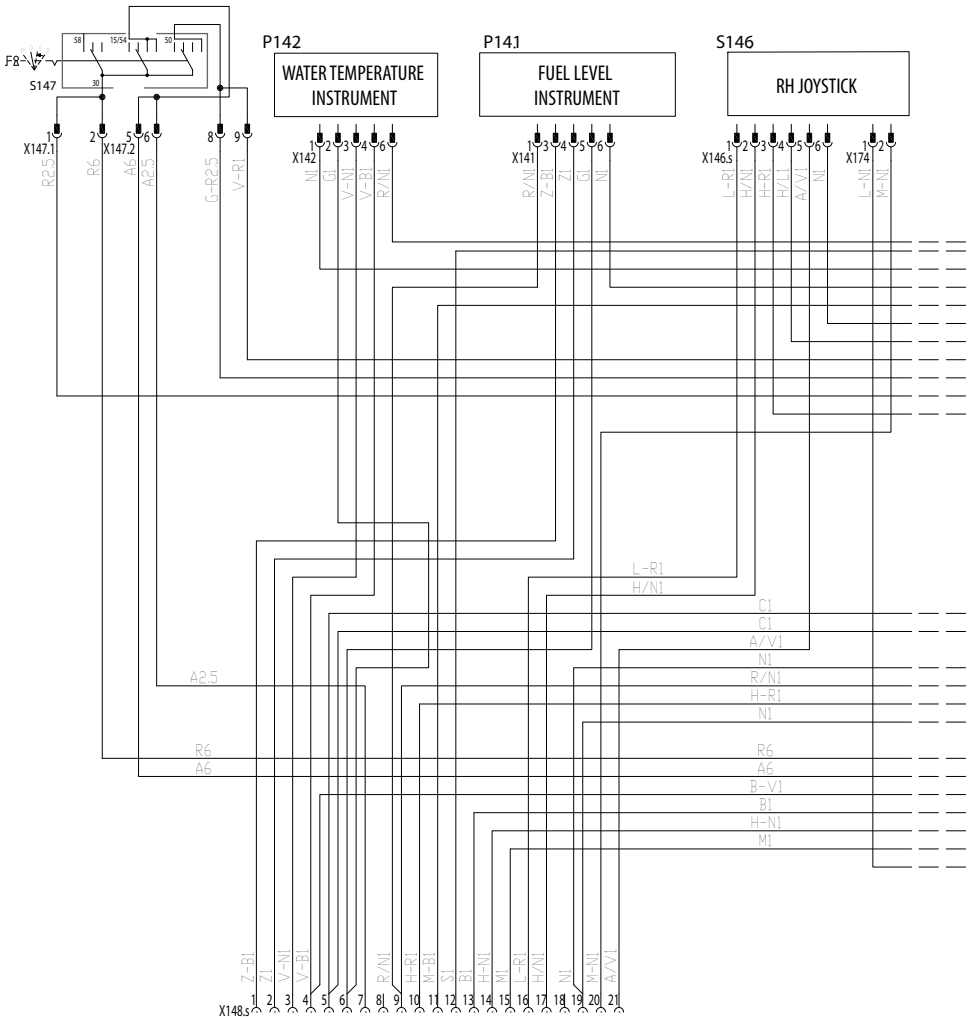

S166
S162
S164
S167
B159
S168
LH JOYSTICK
X159
X168
X170.s
GND
CONNECT TO X170.p
ON CAB LINE

ES2-1010B

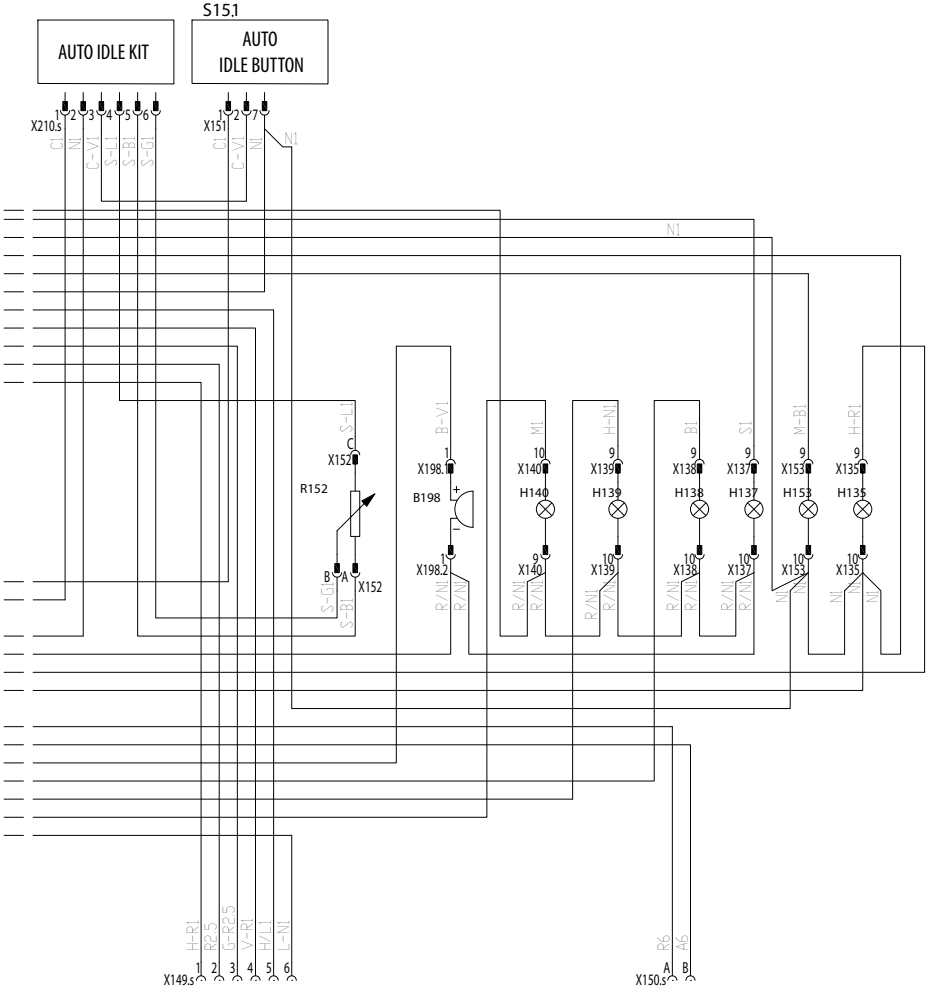
10.4.4 Left side dashboard line diagram - 0A029202 REV02

NAME	DESCRIPTION
A157	AIR CON./HEATER CONTROL BOX
B159	ARMREST MICROSWITCH
P158	HOUR METER
R163	HOT / COLD POTENTIOMETER
S162	FRONT WIPER SWITCH
S164	ROOF ROTATING LIGHT SWITCH
S165	FANS SELECTOR
S166	WORK LIGHT SWITCHES
S167	AIR CONDITIONING SWITCH
S168	LEFT JOYSTICK
S169	(OPTIONAL) CUTTER SWITCH
X155.s	CONTROL BOX LINE INTERFACE CONNECTOR CONTROL BOX
X160	CIGARETTE LIGHTER SOCKET
X161.S	BUCKET RELEASE SELECTOR INTERFACE CONNECTOR
X170.S	CAB INTERFACE CONNECTOR

WIRING COLOUR CODING LEGEND	
A	LIGHT LUE B
B	WHITE
C	ORANGE
G	YELLOW
H	GREY
L	DARK LUE B
M	BROWN
N	BLACK
R	RED
S	PINK
V	GREEN
Z	PURPLE
	A-B = LIGHT BLUE / WHITE LENGTHWISE
	A-B = LIGHT BLUE / WHITE CROSSWISE


F8
S147
58
15/54
50
30
X147.1
X147.2
R2.5
R6
A6
A2.5
G-R2.5
V-R1
P142
WATER TEMPERATURE INSTRUMENT
X142
N1
G1
V-N1
V-B1
R/N1
P141
FUEL LEVEL INSTRUMENT
X141
R/N1
Z-B1
Z1
G1
N1
S146
RH JOYSTICK
X146.5
L-R1
H/N1
H-R1
A/V1
N1
X174
L-N1
M-N1
L-R1
H/N1
C1
C1
A/V1
N1
R/N1
H-R1
N1
A2.5
R6
A6
R6
A6
B-V1
B1
H-N1
M1
X148.5
Z-B1
Z1
V-N1
V-B1
R/N1
H-R1
M-B1
S1
B1
H-N1
M1
L-R1
H/N1
N1
M-N1
A/V1

ES2-1000A

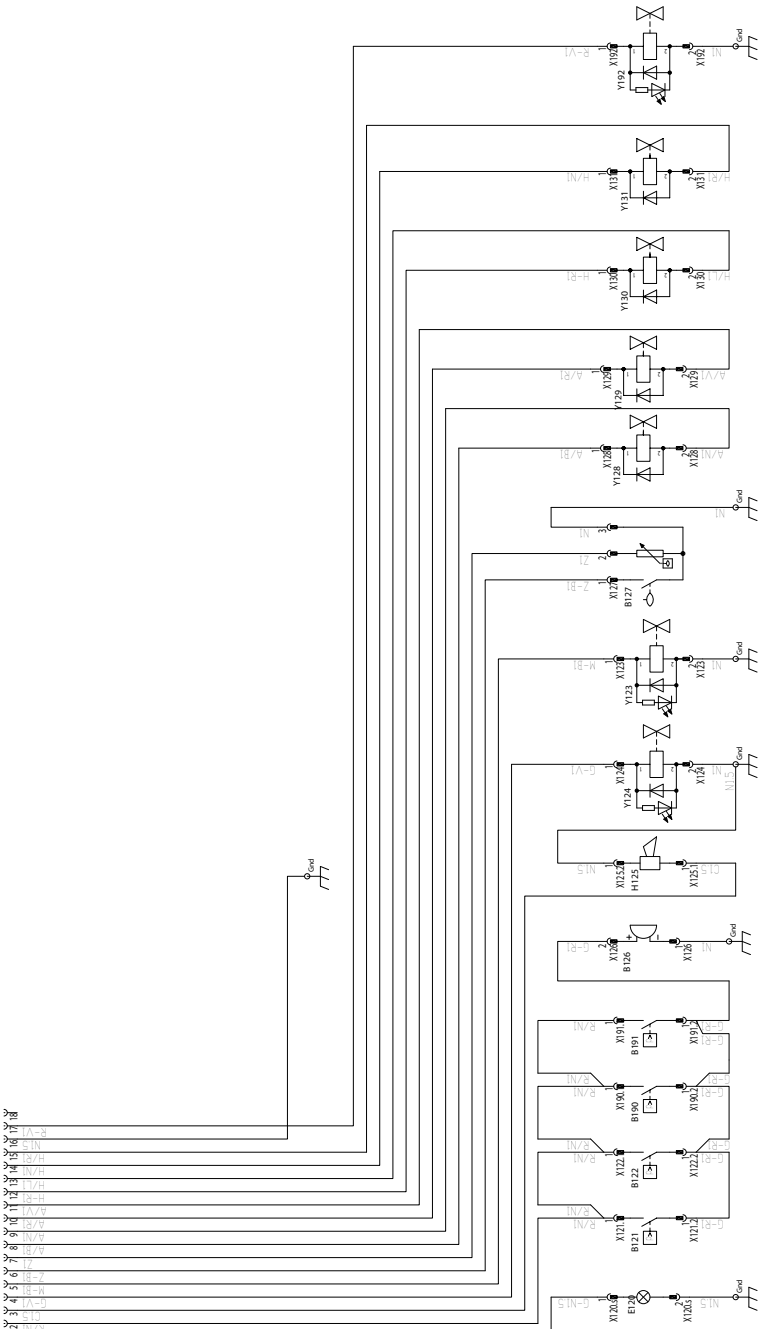

S15.1
AUTO IDLE KIT
AUTO IDLE BUTTON
X210.s
X151
N1
X152
R152
B198
X198.1
X198.2
X140
X139
X138
X137
X153
X135
H140
H139
H138
H137
H153
H135
X149.s
X150.s

ES2-1000B

10.4.5 Pedals line diagram - 0A029197 REV02

NAME	DESCRIPTION
B121	MOMENT 1 PRESSURE SWITCH
B122	PRESSOSTATO MOMENTO 2
B126	TRANSFER BUZZER
B127	FUEL LEVEL SENSOR
B190	PRESSOSTATO MOMENTO 3
B191	PRESSOSTATO MOMENTO 4
E120	BOOM WORK LIGHT
H125	HORN
Y123	FAST DRIVE SOLENOID VALVE
Y124	GENERAL SOLENOID VALVE
Y128	BOOM SWING 1 SOLENOID VALVE
Y129	BOOM SWING 2 SOLENOID VALVE
Y130	OPTIONAL 1 SOLENOID VALVE
Y131	OPTIONAL 2 SOLENOID VALVE
Y192	BUCKET RELEASE SOLENOID VALVE
X132.S	CONTROL BOX LINE INTERFACE CONNECTOR

WIRING COLOUR CODING LEGEND	
A	LIGHT LUE B
B	WHITE
C	ORANGE
G	YELLOW
H	GREY
L	DARK LUE B
M	BROWN
N	BLACK
R	RED
S	PINK
V	GREEN
Z	PURPLE
	A-B = LIGHT BLUE / WHITE LENGTHWISE
	A-B = LIGHT BLUE / WHITE CROSSWISE



ES2-1020

10.4.6 Fuses and relays

WARNING

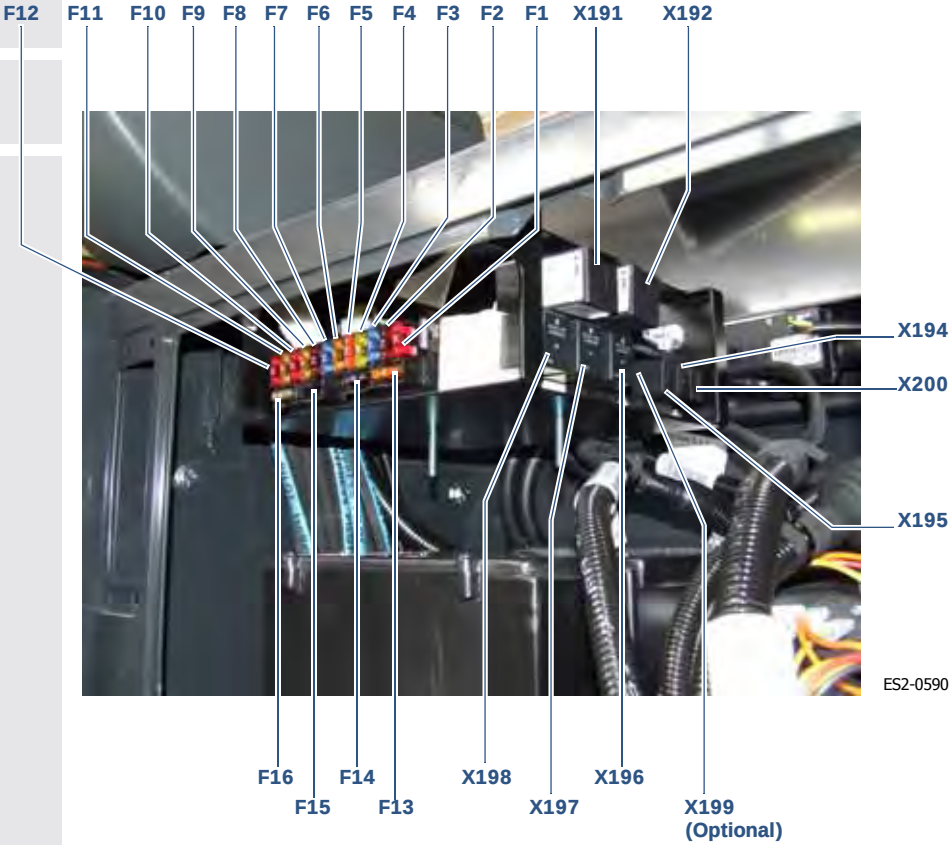
Before replacing any fuses and/or relays, make sure that the engine has been switched off, that the ignition key has been removed that the battery has been disconnected.

The fuses protect the electrical components and wiring against damage. The relays are used to activate the high power circuits.

If a fuse or a relay appear to be rusty, or are loose in their holders, fit new ones immediately.

Always replace a fuse with another of the same capacity.

To access the fuses and relays, remove the glove box flap under the operator's seat.


F12
F11
F10
F9
F8
F7
F6
F5
F4
F3
F2
F1
X191
X192
X194
X200
X195
ES2-0590
F16
F15
F14
F13
X198
X197
X196
X199
(Optional)

List of fuses

F1	5 A	+30 cigarette lighter
F2	25 A	Power to air conditioner relay
F3	5 A	Power to work lights
F4	7.5 A	Power to heating relay
F5	40 A	Power to pre-heating relay and starter relay
F6	5 A	Power to roof rotating light switch
F7	10 A	Optional work light power supply
F8	15 A	Power to windshield wiper switch, wiper motor
F9	20 A	Power to lights, indicator lights and instruments
F10	10 A	Power to fast drive switch, armrest microswitch switch
F11	5 A	Power to cutter pre-fitting (optional)
F12	10 A	Power to auto-idle (if fitted)
F13	15 A	Alternator
F14	7.5 A	Horn
F15	-	Not used
F16	7.5 A	Electrostop

List of relays

X198	Pre-heating relay
X197	Starter relay
X196	Heating relay
X199	(Optional) Cutter relay
X195	Horn relay
	Work lights relay
X200	Air conditioner relay
X191	Ignition anti-repetition relay
X192	Fast drive relay

11.0 Troubleshooting

This section was drawn up in order to assist maintenance staff and help them to identify the most common faults. The list is limited to only thoseproblems that can be solved with ordinary equipment.

IMPORTANT

For other causes not specified in this manual contact the EUROCOMACH service centre.

WARNING

For remedies marked*, kindly contact the EUROCOMACH service centre.

HYDRAULIC CONTROL VALVE

PROBLEMS	POSSIBLE CAUSES	REMEDIES
Inability to hold the load.	Oil leaks from inside the plunger.	Replace valve-housing assembly.
	Oil leaks from the relief valve.	Disassemble and clean or replace relief valve.
Load falls when plunger is shifted from neutral to "raise" position".	Debris has got into the load check valve.	Disassemble and clean load check valve.
	Poppet or seat of load check valve is damaged.	Replace poppet or lap valve seat.
Spool jams.	Abnormal increase in oil temperature.	Remove obstacles to allow oil to flow freely through the pipes.
	Hydraulic fluid is dirty.	Change fluid and clean the hydraulic circuit.
	Pipe port joints are too tight, so the valve housing is sitting in the wrong position.	Check tightening torque. Loosen mounting bolts, check and adjust.
Spool jams.	Debris has got into the grooves of the spool.	Remove debris or replace valve housing assembly.
	Pressure is too high.	Check with pressure gauge and adjust.
	Lever or link is bent.	Remove link and check.
	Spool is bent.	Replace valve-housing assembly.
	Return spring is damaged.	Replace the spring.
	Return spring or end cap is not properly seated.	Loosen end cap, align it and retighten it.
	Internal valve temperature distribution is not uniform.	Warm up entire circuit.

PROBLEMS	POSSIBLE CAUSES	REMEDIES
Oil leakage from oil seal.	Back pressure on valve return circuit is too high.	Use a larger return circuit.
	Debris on the seal.	Remove seal and clean it.
	Seal plate is loose.	Clean seal plate and re-tighten it with bolts.
	Spool is damaged.	Replace valve-housing assembly.
	Seal is pinched or damaged.	Replace oil seal.
Spool does not move.	Valve is clogged up with debris.	Remove debris and clean circuit.
	Spool end cap is full of oil.	Replace end cap seal.
	Drive link is seized anddoes not move.	Make link move freely.

HYDRAULIC MOTOR

PROBLEMS	POSSIBLE CAUSES	REMEDIES
Hydraulic motor does not run at all.	Hydraulic fluid is low.	Add oil.
	Hydraulic pump is faulty.	Replace hydraulic pump.
	Oil leak inside the hydraulic motor.	Replace hydraulic motor.
	Hydraulic motor internal parts are worn.	Replace the entire hydraulic motor or its worn parts.
	Drive shaft is overloaded.	Check load adjustment device and remove cause of overload.
	Oil viscosity is too low.	Replace with hydraulic fluid of the correct viscosity.
Hydraulic motor runs in one direction only.	Relief valve for operating valve is faulty.	Disassemble and clean relief valve for operating valve or replace it.
	Counterbalance spool jams.	Replace counterbalance valve. Replace hydraulic pump. Replace main relief valve.
Hydraulic motor does not run fast enough.	Insufficient incoming oil flow.	Lower oil temperature.
	Oil flow is too high: oil leaks.	Add oil and re-tighten intake joint.
	Air is sucked into the motor.	Re-tighten joints.
	Oil leak inside the hydraulic motor.	Replace hydraulic motor.

PROBLEMS	POSSIBLE CAUSES	REMEDIES
Hydraulic motor makes abnormal noise.	Hydraulic fluid is low.	Add oil.
	Air is sucked into the motor.	Re-tighten joint on the intake side.
	Oil temperature is too high.	Lower oil temperature.
	Hydraulic motor is internally worn or damaged.	Replace hydraulic motor.
	Shaft is incorrectly mounted.	Re-align shaft. Remove cause of cavitation.
Oil leaks from shaft seal.	Oil seal is damaged.	Replace oil seal.
	Shaft is damaged or worn.	Replace shaft.
	Hydraulic motor case internal pressure is too high.	Replace oil seal and clean drain pipe.

HYDRAULIC CYLINDER

PROBLEMS	POSSIBLE CAUSES	REMEDIES
Hydraulic cylinder has inadequate power.	Relief valve pressure setting is too low.	Adjust pressure setting.
	Oil leak inside hydrauliccylinder.	Replace cylinder gaskets.
	Hydraulic cylinder piston or rod is damaged.	Replace hydraulic cylinder piston or rod.
	Oil leak inside drive valve.	Replace valve-housing assembly.
Hydraulic cylinder external oil leak.	Hydraulic cylinder gaskets are defective.	Replace hydraulic cylinder gaskets.
	Hydraulic cylinder rod is damaged.	Replace hydraulic cylinder rod.
Piston does not move smoothly.	Oil temperature is too high.	Lower oil temperature.
	Air is sucked into the motor.	Add oil and re-tighten intake joint.

LIMIT VALVES

PROBLEMS	POSSIBLE CAUSES	REMEDIES
Pressure does not rise at all.	Poppet is stuck and remains open.	Disassemble, check for debris and make sure the poppet moves freely.
	Debris has got into the valve seat.	Clean all parts.
Limit valve is not stable.	Pilot poppet seat is damaged.	Replace damaged parts.
	Pilot piston is jammed against the main poppet.	Disassemble, clean and eliminate surface flaws.
Limit valve does not work properly.	Valve is worn because of debris.	Replace worn parts.
	Lock nut and adjusting screw are loose.	Adjust pressure setting.
Oil leaks.	Valve seats are damaged and O-rings are worn.	Replace damaged and worn parts.
	Parts are jammed because of debris.	Disassemble, check that parts are free of flaws, clean and reassemble them.

ACCESSORIES

PROBLEMS	POSSIBLE CAUSES	REMEDIES
Overall operating power decreases.	Engine power is low.	Refer to engine manual.
	Hydraulic pump is worn.	Replace hydraulic pump.
	Main relief valve is defective.	Adjust pressure or replace valve.
	Hydraulic fluid is low.	Add oil.
	Hydraulic fluid viscosity is wrong.	Replace with hydraulic fluid of the correct viscosity.
	Intake filter is clogged.	Replace intake filter.
All functions are faulty.	Hydraulic pump is faulty.	Replace hydraulic pump.
	Hydraulic fluid is low.	Add oil.
Accessory's power is down.	Main or secondary relief valve pressure is set too low or incorrectly.	Adjust pressure setting or replace relief valve.
	Hydraulic cylinder gaskets are damaged.	Replace hydraulic cylinder gaskets.
	Hydraulic cylinder piston and cylinder are damaged.	Replace hydraulic cylinder piston and cylinder or modify assembly.
Attachment falls under its own weight.	Hydraulic cylinder gaskets are damaged.	Replace hydraulic cylinder gaskets.
	Hydraulic cylinder piston and cylinder are damaged.	Replace hydraulic cylinder piston and cylinder or modify assembly.
	Oil leak inside drive valve.	Replace valve-housing assembly.
Accessory connections are noisy.	Oil or grease level is low.	Add oil or grease.
	Connecting pin vibrates.	Replace bush or pin.

TRAVELLING

PROBLEMS	POSSIBLE CAUSES	REMEDIES
Travelling power is low.	Main relief valve pressure setting is too low.	Adjust pressure setting.
	Counterbalance valve is defective.	Replace counterbalance valve.
	Hydraulic motor performance has dropped.	Replace hydraulic motor.
	Swivel joint gaskets are damaged.	Replace swivel joint gaskets.
	Hydraulic pump performance has dropped.	Replace hydraulic pump.
	Oil leak inside drive valve.	Replace valve-housing assembly.
Machine moves erratically.	Track tension is too high.	Adjust the track tension.
	Stones or foreign objects are present.	Remove any stones or foreign objects.
	Counterbalance valve is defective.	Replace counterbalance valve.
	Hydraulic motor performance has dropped.	Replace hydraulic motor.
	Hydraulic motor sucks air.	Add oil.
Machine does not run in a straight line.	Right and left track tension is different.	Adjust them to equaland proper tension.
	Hydraulic pump performance has dropped.	Replace hydraulic pump.
	Hydraulic motor performance has dropped.	Replace hydraulic motor.
	Oil leak inside drive valve.	Replace valve-housing assembly.
	Swivel joint gaskets are damaged.	Replace swivel joint gasket.
	Lever links are loose.	Adjust.

OPERATION LEVERS

PROBLEMS	POSSIBLE CAUSES	REMEDIES
Levers hard to operate.	Debris in the drive valve spool.	Clean the drive valve.
	Valve plunger jams.	Replace valve-housing assembly.
	Lever links lack lubrication.	Apply oil or grease.
	Lever links are too tight.	Apply oil or grease.

HYDRAULIC PUMP

PROBLEMS	POSSIBLE CAUSES	REMEDIES
No oil flows from hydraulic pump.	Hydraulic fluid is low.	Add oil.
	Intake filter is clogged.	Replace filter. If oil is dirty, replace it with fresh oil.
Hydraulic pump pressure does not rise.	Hydraulic pump internal oil leak.	Replace hydraulic pump.
	Hydraulic pump sucks air.	Add oil and check intake hose.
	Main relief valve pressure is set too low.	Adjust pressure setting.
Abnormal noise from hydraulic pump.	Cavitation due to bent intake pipe or clogged intake filter.	Replace filter. If oil is dirty, replace it with fresh oil.
	Air is sucked in due to loose intake joint or shortage of hydraulic fluid.	Re-tighten intake joint or add oil.
	Cavitation due to hydraulic fluid viscosity.	Replace with hydraulic fluid of the correct viscosity.
	Pump and engine are not aligned.	Re-align them.
	Hydraulic fluid contains bubbles.	Check cause of bubbles and remove it. (Replace oil with fresh oil)
Oil leaks out from hydraulic pump.	Hydraulic pump seal is defective.	Replace seal or replace hydraulic pump.

SWIVEL JOINT

PROBLEMS	POSSIBLE CAUSES	REMEDIES
Operating power is low.	Swivel joint gasket is defective.	Replace swivel joint gasket.
	Swivel joint rotor is damaged.	Replace swivel joint.
Oil leaking out of Swivel joint.	Swivel joint gasket is defective.	Replace swivel joint gasket.

ROTATION

PROBLEMS	POSSIBLE CAUSES	REMEDIES
Swivel power is low.	Hydraulic motor performance has dropped.	Replace hydraulic motor.
	Swivel ring is jammed.	Oil/grease or replace swivel ring.
Swivel retarder keeps turning.	Retarder valve pressure is set too low.	Adjust pressure setting.
	Port relief valve or retarder valve is clogged.	Clean port relief valve or retarder valve.
	Hydraulic motor performance has dropped.	Replace hydraulic motor.
	Oil leak inside drive valve.	Replace valve-housing assembly.
Swivelling continues with retarder activated.	Port relief valve or retarder valve pressure is set too low.	Adjust pressure setting.
	Port relief valve or retarder valve is clogged.	Clean port relief valve or retarder valve.
	Hydraulic motor performance has dropped.	Replace hydraulic motor.
	Oil leak inside drive valve.	Replace valve-housing assembly.
Abnormal noise when swivelling.	Hydraulic motor sucks air.	Add oil.
	Swivel bearing is not well lubricated.	Add oil/grease.

ENGINE AND RELATED PARTS

PROBLEMS	POSSIBLE CAUSES	REMEDIES
Engine does not start.	Defective starter switch.	Repair the defective connection and contact positions.
	Defective starter motor revolution.	Remedy possible flat battery, starter motor failure or bad or loose connections on power distribution.
	Incorrect viscosity of engine oil.	Check and remedy. Pre-heat with an air heater.
	Engine extremely cold.	Warm the coolant (add hot water).
	Crankshaft, camshaft, piston or bearing seized.	Repair.
	Air in the fuel system.	Drain the fuel system completely.
	No fuel in tank.	Add fuel.
	Poor fuel quality.	Inspect and replace.
	Fuel filter clogged.	Clean or replace.
	Compression inadequate.	Repair.
	Defective fuel injection pump.	Repair.
Engine stops suddenly when running.	No fuel in tank.	Add fuel.
	Fuel filter clogged.	Clean or replace.
	Air in the fuel system.	Tighten the joints on fuel system pipes.

PROBLEMS	POSSIBLE CAUSES	REMEDIES
Oil pressure is defective.	Oil shortage.	Add oil.
	Oil leakage from joint.	Repair it.
	Defective oil pressure switch.	Replace it.
	Oil filter clogged.	Replace filter element.
	Oil viscosity low.	Replace with oil suitable for the operating temperature.
	Oil pump not working properly.	If the problem persists after re-adjusting and cleaning, replace it.
Engine overheating.	Coolant level low	Top up.
	Water leak.	Check hoses and radiator.
	Fan belt tension incorrect.	Adjust or replace.
	Radiator failure.	Repair or replace.
	Fan broken.	Replace it.
	Anti-freeze concentration too high.	Dilute mixture.
	Thermostat failure.	Replace it.
	Water pump failure.	Replace it.
Defective charging of battery.	Fan belt tension incorrect.	Adjust tension.
	Cables defective.	Repair them.
	Faulty indicator light.	Replace it.
	Battery failure.	Check connections, recharge, replace.
	Regulator failure.	Replace it.
	Alternator failure.	Repair or replace.

ENGINE AND RELATED PARTS

PROBLEMS	POSSIBLE CAUSES	REMEDIES
White or blue smoke coming from the exhaust.	Too much oil.	Reduce to the specified level.
	Viscosity of oil is too low.	Replace it with oil of suitable, viscosity.
	Over-cooling of radiator.	Put a cover on the radiator or replace it.
	Incorrect injection timing.	* Re-adjust.
	Compression low.	* Strip-down, inspect, or replace the part.
Black or dark grey smoke coming from the exhaust.	Poor fuel quality.	Replace with better quality fuel.
	Incorrect valve clearance.	Adjust it.
	Injection pump operating incorrectly.	* Adjust and replace if necessary.
	Compression low.	* Strip-down, inspect, or replace the part.
	Air intake blocked (clogged air filter).	Clean or replace the element.
Fuel consumption too high.	Injection pump operating incorrectly.	* Adjust and replace if necessary.
	Injection nozzle failure.	* Adjust and replace if necessary.
	Incorrect injection timing.	* Adjust and repair it or replace it with a better one.
	Poor fuel quality.	Replace with better quality fuel.
	Compression inadequate.	* Strip-down, inspect and replace the parts if necessary.
	Air intake blocked.	Clean or replace the element.

PROBLEMS	POSSIBLE CAUSES	REMEDIES
Oil consumption is too high.	Too much oil.	Reduce to the specified level.
	Oil viscosity low.	Replace with oil of suitable viscosity for the operating temperature.
	Oil leaks.	Locate leak and tighten it or replace part if necessary.
	Cylinder piston ring worn.	* Strip-down, inspect and replace the parts if necessary.

CONTROL ELECTRONICS

PROBLEMS	POSSIBLE CAUSES	REMEDIES
With the engine running and the control exclusion lever lowered, no functions work when the command rollers are moved	Electronic control box power error.	Switch the machine off and then on again.
	Roller disconnected on joystick.	Open the joystick and check the roller electrical connection.
	Faulty roller.	Replace the roller.
	Faulty control box.	Replace the control box.

AZIENDA CON SISTEMA DI GESTIONE PER LA QUALITÀ CERTIFICATO DA DNV
=UNI EN ISO 9001:2008=

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